

The AUTOMOBILE

\$1,058,000,000 from Crops in Valley West of Mississippi

KANSAS CITY, MO., July 21—Corn, spring wheat, and winter wheat, are the big three factors in determining the automobile buying possibility of the great agricultural plains west of the Mississippi, from Texas to the Northern boundary, and embracing Missouri, Kansas, Oklahoma, Nebraska, Minnesota and North and South Dakota.

From these States alone conservative estimates place the crop value for this year at \$1,058,000,000, this total embracing only, at a sane market value, corn, spring wheat, and winter wheat.

As the automobile buying possibilities of these States are so largely dominated by the farmer, the crop value can be taken as a fair criterion of what automobile sales will be during 1916, and in spite of the almost daily reports of rain in these States, attended with stories of flooded farm land and washouts, it can be emphatically stated at this time that there is no danger to the great ready-money wheat crop which the Central West is now harvesting.

For days the market reports have contained reports of rain and flood, and men familiar with market conditions have feared the farmers would be unable to get into the fields for their harvesting. But Kansas, the biggest of all the winter wheat States, is three-fourths through; Oklahoma has practically finished and harvesting is proceeding in Nebraska; Missouri has fared about the same as Kansas. Grain men on the Kansas City Board of Trade who study crop conditions as closely as the market quotations themselves, are satisfied that the big four winter wheat States will have another huge

crop, while the reports from the spring wheat States of the Northwest are equally encouraging. The rains in the Southwest will have some effect in shortening the crop, but nothing like what was feared if the rains kept up.

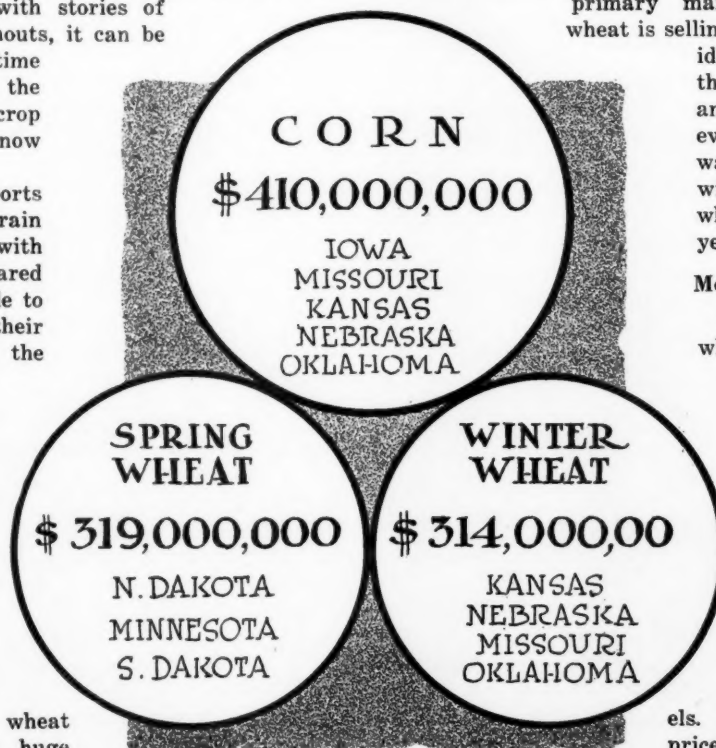
Good Wheat Prices

The Turkish forts still hold at this writing and if they should fall, it is believed by the grain men generally, that the price of wheat would be very little affected by the opening of the Dardanelles to Russian grain. There might come a quick drop, as was the case at the beginning of the attack, but they believe the market will go up again.

Cash wheat, of which there is very little now, is worth on the farm \$1.10 to \$1.40, depending on the distance from the primary market. For future delivery wheat is selling at \$1.10, which gives a fair idea of what the wheat buyers think of the size of the crop and the war conditions. However, it is probable that if the war keeps going the farmers will get as good prices for their wheat this year as they got last year.

Money for Automobiles

With three-fourths of its wheat harvested, it is now estimated that Kansas will produce close to 135,000,000 bushels of wheat. This is 40 per cent larger than any previous crop except the one of last year when the State produced 180,000,000 bushels and sold it at its greatest price, from 90 cents to \$1.40, depending on the time of sale. The average wheat crop in Kansas is 70,000,000 bushels. With the wheat at the war prices of last year, Kansas would



get from \$130,000,000 to \$190,000,000 for its wheat crop. Imagine between \$130,000,000 and \$190,000,000 brought into a State largely from Europe, to pay the farmer for something that he has created. A ready-money crop with which the farmer may buy what he chooses!

70,000,000 Bushels in Nebraska

While Kansas is the greatest of the winter wheat States, Nebraska this year will produce 70,000,000 bushels on the July estimates. Missouri will have 37,000,000 bushels, a slight decrease over May estimates and Oklahoma will have 44,000,000 bushels. While Oklahoma will fall about 6,000,000 bushels below a normal wheat crop, Missouri will go as much over its normal crop. This means from the big four wheat States, 286,000,000 bushels of wheat this year. At the present quotation for September delivery this means \$314,000,000 cash for this crop. If the war is on when the delivery of wheat begins in September, prices equal to last year's will be no surprise and they may go higher. At last year's war prices the crop of these four States will bring \$400,000,000, all cash, which ought to be good news for the motor manufacturers with their increased output this year. While the rains have been heavy in the grain States in a season when the farmers needed dry periods for their work in the fields, the downpours offset the loss from the chinch bug which were doing great havoc.

Spring Wheat Reports

Reports from the spring wheat States of the Northwest are equally encouraging. The big three, North Dakota, Minnesota, and South Dakota, report good growth, and while the crop, of course, will not be harvested until some time after the winter wheat crop, there is every reason to look for a big crop, both on account of acreage, and the spring rains. The rains have not been so frequent in the western part of South and North Dakota. Nebraska has of late years become almost entirely a winter wheat State, but this year it will have the usual amount of spring wheat. The outlook in the spring wheat States based on the acreage is:

| STATE | ESTIMATED ACREAGE | ESTIMATED BUSHEL |
|--------------------|----------------------|---------------------|
| North Dakota | 8,000,000 | 106,000,000 |
| Minnesota | 4,500,000 | 65,000,000 |
| South Dakota | 3,750,000 | 53,000,000 |
| Nebraska | 300,000 | 4,000,000 |

This makes a total of 228,000,000 bushels of spring wheat, worth at war prices \$319,000,000. That gives in the spring and winter wheat States this year and fall \$719,000,000 in cash from outside sources.

Corn Is Backward

The July indication for corn in the corn belt of the grain States indicate a good corn crop this year. The rains, while so frequent in many sections that they have prevented cultivation, have given the corn a fine growth and the weeds can be pretty well taken care of in the next two weeks. From the July reports of corn conditions these estimates can be made of the crop outlook for these States, the principal corn States:

| STATE | 1914 CROP, BUSHEL | NORMAL CROP, BUSHEL | ESTIMATE FOR 1915, BUSHEL |
|----------------|----------------------|------------------------|------------------------------|
| Iowa | 383,000,000 | 400,000,000 | 306,000,000 |
| Kansas | 108,000,000 | 175,000,000 | 96,000,000 |
| Missouri | 158,000,000 | 200,000,000 | 183,000,000 |
| Nebraska | 175,000,000 | 200,000,000 | 156,000,000 |
| Oklahoma | 50,000,000 | 100,000,000 | 80,000,000 |

This is a total of 821,000,000 bushels of corn in the five big corn States west of the Mississippi River, a crop that will sell from 50 to 75 cents a bushel, bringing from \$410,000,000 to \$615,000,000 if sold for shipment. However, these States feed their corn and sell their livestock so that the re-

turn is much greater. Wars do not generally affect the price of corn except in that it affects the price of meat.

The other field crops of the West are doing well. The alfalfa of Kansas alone this year will make a \$15,000,000 crop. The value of these crops will mean that the farmer will have less need of his wheat money in taking care of actual living expenses. The grain States of the Mississippi Valley may all be judged from the condition of Kansas, which raised nearly half of the winter wheat in the western States.

Automobile Increase 442 Per Cent

It is of unusual interest to note the way in which motor car sales have increased in Kansas, which represents probably more than any other State the farmer himself. Since 1910 the increase of automobiles in the State has been 442 per cent. The increase for the whole United States has been in the same period 240 per cent. Of the States that have 20,000 motor cars in use, Kansas's percentage of increase has been exceeded by only one State, Minnesota, great in spring wheat and dairy products.

This increase by years from 1910 shows:

| | | |
|--------------------|--------|--------|
| March, 1910 | 9,301 | Gain |
| March, 1911 | 14,456 | 5,115 |
| March, 1912 | 18,625 | 4,139 |
| March, 1913 | 24,794 | 6,169 |
| Jan. 1, 1914 | 34,945 | 10,151 |
| Jan. 1, 1915 | 50,454 | 15,509 |

Cars in Kansas

The survey of the automobile users in Kansas serves as a lesson in what the farmer means to the automobile industry. Kansas has only one large city, Kansas City, Kan., and that city has less than 100,000 population. The other cities of the States are county seat towns, mostly running from 1000 to 5000 population. There are two or three exceptions, Topeka, Leavenworth, Wichita, Atchison and Hutchinson, but with the exception of Topeka all represent the farmer and all live from the farmer's products. A survey of the industry in the State shows that where the towns are smallest the number of persons per car is likewise smallest.

Twenty-two Persons per Car

Pawnee county in the central part of the State, where wheat rules, has 547 cars with an average of only fourteen persons to the car. Almost as good a showing is made in Edwards and Lincoln counties with an average of fifteen persons per car each. Such thickly settled counties as Barton and Reno show averages of twenty-two persons per car each. And in Barton county are several small towns and in Reno the town of Hutchinson with a population of 16,000.

75,000 Cars Possible

It is impossible to give the figures of every county in the State with the number of cars and the number of persons per car, also showing the remarkable way in which the average of persons per car is going down. The moral, of course, is that where there are twenty-two persons per car in a county filled up with average sized farms, some small towns and a city the size of Hutchinson, every other county in the State, barring possibly the counties with towns of more than 50,000, can be made to have as low a percentage. This means that Kansas with a population in 1914 of 1,672,106 could be showing the use of 75,000 automobiles without difficulty and if the lowest present percentage of any county in Kansas were reached over the entire State, the number of cars in use would be 111,474, more than twice as many as are in use at present. And is there any reason why a rich Kansas county should not have as few persons per car as a county that is poorer in wealth which is the case in a third of the 105 counties of the State?

New Four Heads Jeffery Production List

Is Larger, More Powerful and Better Engineering Than Previous Model and Sells at Far Lower Price—Two Sixes Practically Unchanged Though Prices Are Lower

INCREASED production and clever engineering are factors in the success of the Thomas B. Jeffery Co., Kenosha, Wis., in bringing a car listing at \$1,550 in 1914 down to the \$1,000 class in price while at the same time making its details of construction and general appearance far in advance of the earlier, more expensive car.

The answer of the Jeffery company, Kenosha, Wis. to the appeal of the buyers, is a standard four-cylinder, seven-passenger car at \$1,035 or the same car without extra tonneau seats at \$1,000. This car uses the same motor as the \$1,275 four of 1915, but the refinements and changes made in the chassis and the substitution of an entirely new body make it stand out as a new vehicle built to the demands of the American purchaser and sold at a price within his means.

Jeffery's new four will head the factory production list but as trailer there is the Jeffery six at \$1,350, which in the 1915 season was called the Chesterfield and listed at \$1,650. The six has been changed little, so little in fact that the maker has laid no stress on the refinements, making more striking the importance of the four.

Larger Than Previous Four

While the car has been reduced \$275, it is larger than the previous four, it is more powerful and a better hill climber, shows better fuel economy, is easier to handle and on the whole is a better vehicle and will be heralded as such by those making a comparative design study. In general it has a 3% by 5% block motor, disk clutch, three-speed gear-set, and semi-floating axle. The wheelbase is 116 in. and tires 34 by 4.

Three varieties of changes have been made, those resulting in better performance, greater stability and better appearance.

Under the first head comes the motor changes, which outlined briefly are: a change from separate gearset to unit power plant construction, alterations in carburetion, ignition, and the adoption of a new Bijur two-unit cranking and lighting system. The camshaft has been redesigned, the crankcase changed in material and appearance and the cooling system has been gone over.

Also under performance changes comes the new clutch which is fitted with a brake, longer rear springs, a new gear-set of the three-speed type instead of four and behind it the emergency brake. The whole driving system is new from flywheel to axle.

The changes tending to greater stability of the mechanism are seen in the use of different metals in various places. The crankcase, for example is of cast iron instead of aluminum. The weight of the car has been reduced and there has been a re-proportioning of sprung to unsprung weight.

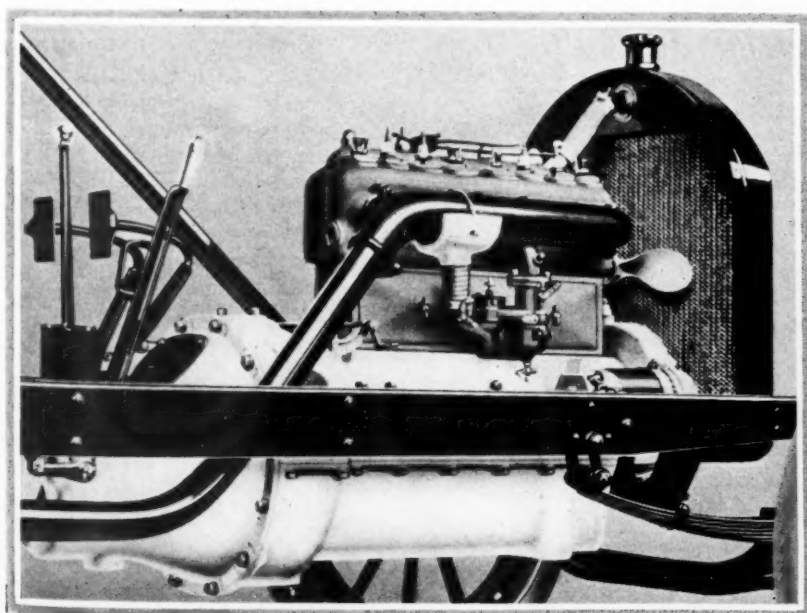
The appearance changes are apparent. The body is a cleverly laid out one of new lines, with new equipment and much roomier than the older one.

In the motor there are not so many changes as elsewhere but even though few they are quite important.

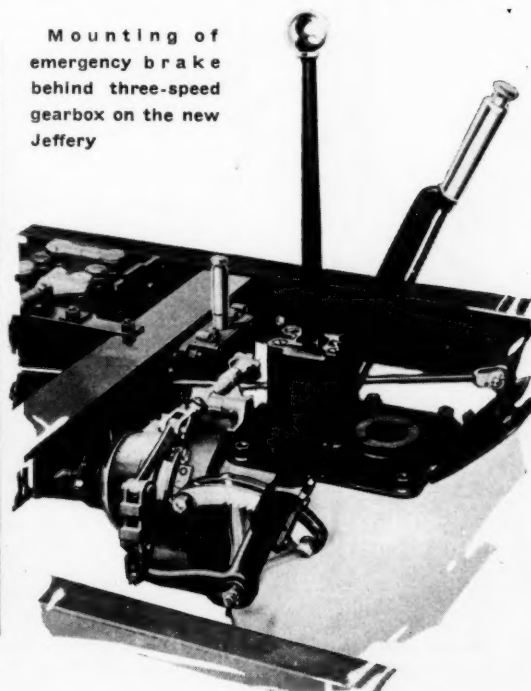
The cylinder dimensions, 3% to 5%, are the same as before but the power, especially for hard pulling such as hill-climbing work, has been increased by using a new camshaft with different-shaped cams and these placed so as to change the valve timing as follows:

| | 1916 | 1915 |
|----------------------|------------------|------------------|
| Inlet opens | 12 degrees late | 18 degrees late |
| Inlet closes | 46 degrees late | 46 degrees late |
| Exhaust opens | 46 degrees early | 47 degrees early |
| Exhaust closes | 12 degrees late | 15 degrees late |

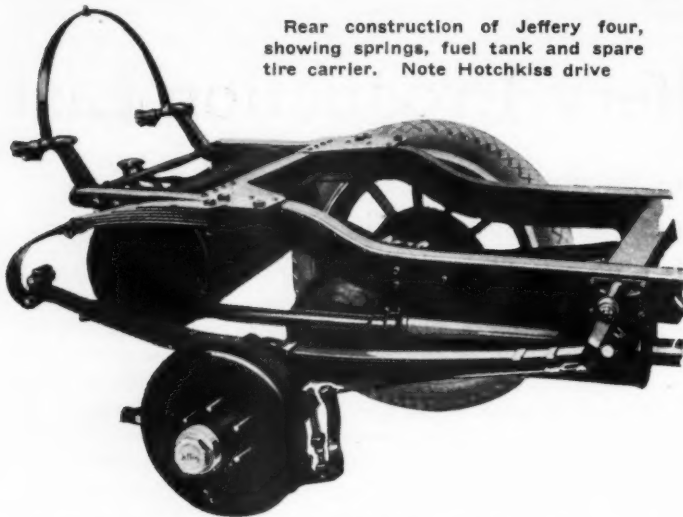
With the change in camshaft design the push rods now are of the mushroom type instead of roller as previously. All



Intake side of four-cylinder block motor used in the new Jeffery which sells at \$1,000 as a five-passenger and with extra tonneau seats at \$1,035



Mounting of emergency brake behind three-speed gearbox on the new Jeffery



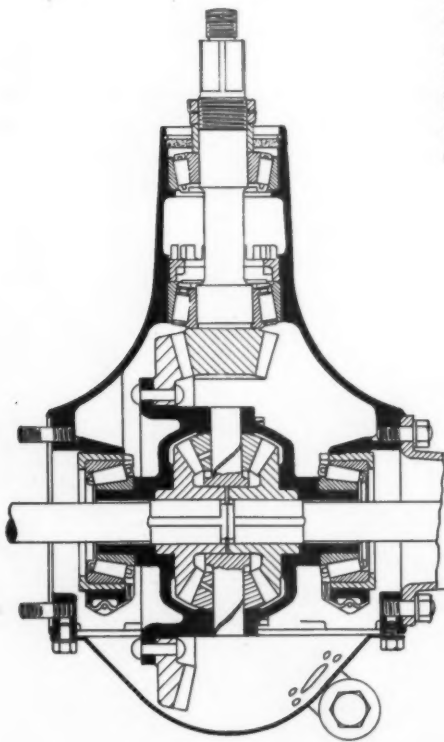
Rear construction of Jeffery four, showing springs, fuel tank and spare tire carrier. Note Hotchkiss drive

of this has been done to get a better effective valve opening and to give more snap to the engine on hill work and rough going.

A power addition also has been obtained, and with it a slight increase in fuel economy, by joining the inlet and exhaust manifolds; that is, having them become integral at one point. This means that the heat from the exhaust manifold is imparted to the inlet and hence better vaporization is obtained. The carbureter, which is on the right side, is new, being a type K Stromberg, and mounted in a better position. It is slightly higher and feeds through cored passages which have been smoothed and straightened out so as to increase the speed of the ingoing gases. The carbureter now is fed from a Carter fuel tank by gravity instead of by pressure.

The exhaust manifold now attaches to the exhaust pipe without flange and bolts, the joint being a pinch fit. This makes a better joint, a simpler one and one which will not cause leakage so readily.

On the left side of the motor a change is apparent. The Folberth pump which used to be driven from the water-pump shaft has been removed and now is on top of No. 4 cylinder.



Section through the new Jeffery semi-floating rear axle which is mounted on roller bearings and is 50 lb. lighter than the former axle. Shaft tubes are seamless steel and differential housing is malleable iron

The magneto also driven by the water pump shaft now is a Bosch NU4 instead of a Bosch duplex and, by the way, this is the only source of ignition. The removal of the tire pump has allowed of the magneto being placed a little more forward and in a more accessible position.

The valves are still of Rich tungsten steel but the springs have fewer convolutions and have lighter tension so as to work better in conjunction with the mushroom followers. Now that the lift is not so abrupt, these changes give better valve opening and closing and hence better performance at the higher speeds.

New Aluminum Fan

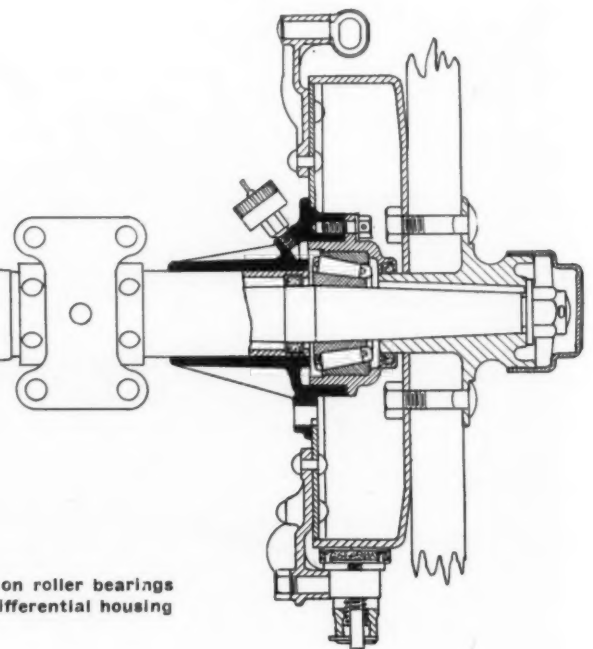
In the cooling system there is a new two-blade, aeroplane-type fan made of aluminum instead of the former pressed-steel, five-blade type. This change has saved a little weight and the new fan gives a greater air draught and working in conjunction with a new radiator gives better all-round cooling efficiency. The radiator is a new tubular type of 8 gal. capacity instead of 9, it is 25 lb. lighter in weight when filled and has greater cooling area. This radiator is made by the National Can Co. while the former one was made in the Jeffery shops.

The crankcase upper half now is of cast iron instead of aluminum the change having been made to save money and make a more rigid construction. The crankcase cover still is of aluminum. Also, there is a new form of bell housing to accommodate the clutch and gearset which was not the case before.

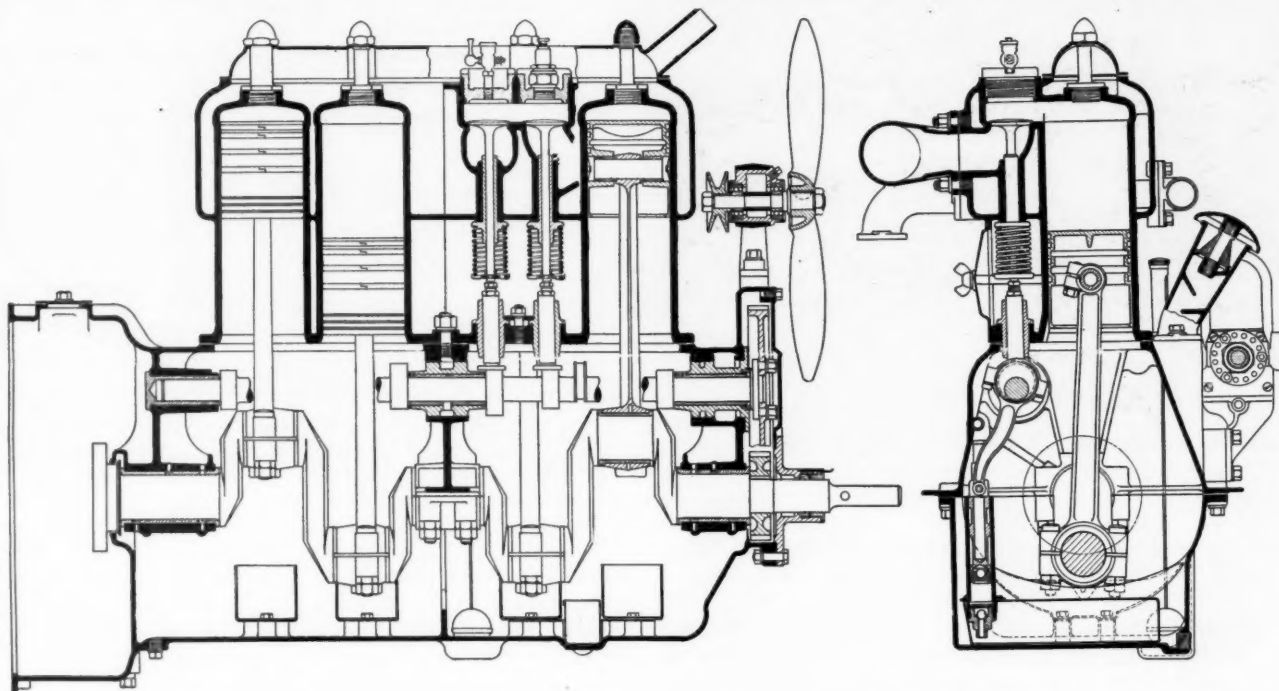
Few Motor Changes

In the interior, the motor has not been changed much. The crankshaft is a 2-in. with three bearings of the following sizes: front, $3\frac{1}{4}$, center, $3\frac{1}{4}$, end, $4\frac{1}{2}$. The pistons and rods remain the same and show nothing out of the ordinary. The piston weight is 3 lb. $9\frac{1}{2}$ oz., including pin and rings, the piston length, 4-38 in. and the pin diameter, 15-16 in. The rings are a step-joint type. The connecting-rods weigh 4 lb. 10 oz. and are $12\frac{1}{4}$ in. center to center.

The oiling system is of the force feed and splash in which a plunger pump feeds the main bearings directly by leads and also supplies troughs under the connecting-rods. A slight change here is the feeding of the idler gear bearing in the timing case, by a lead from the pump. It was found this bearing wore too rapidly in the older model, in which the bearing was fed by crankcase oil.

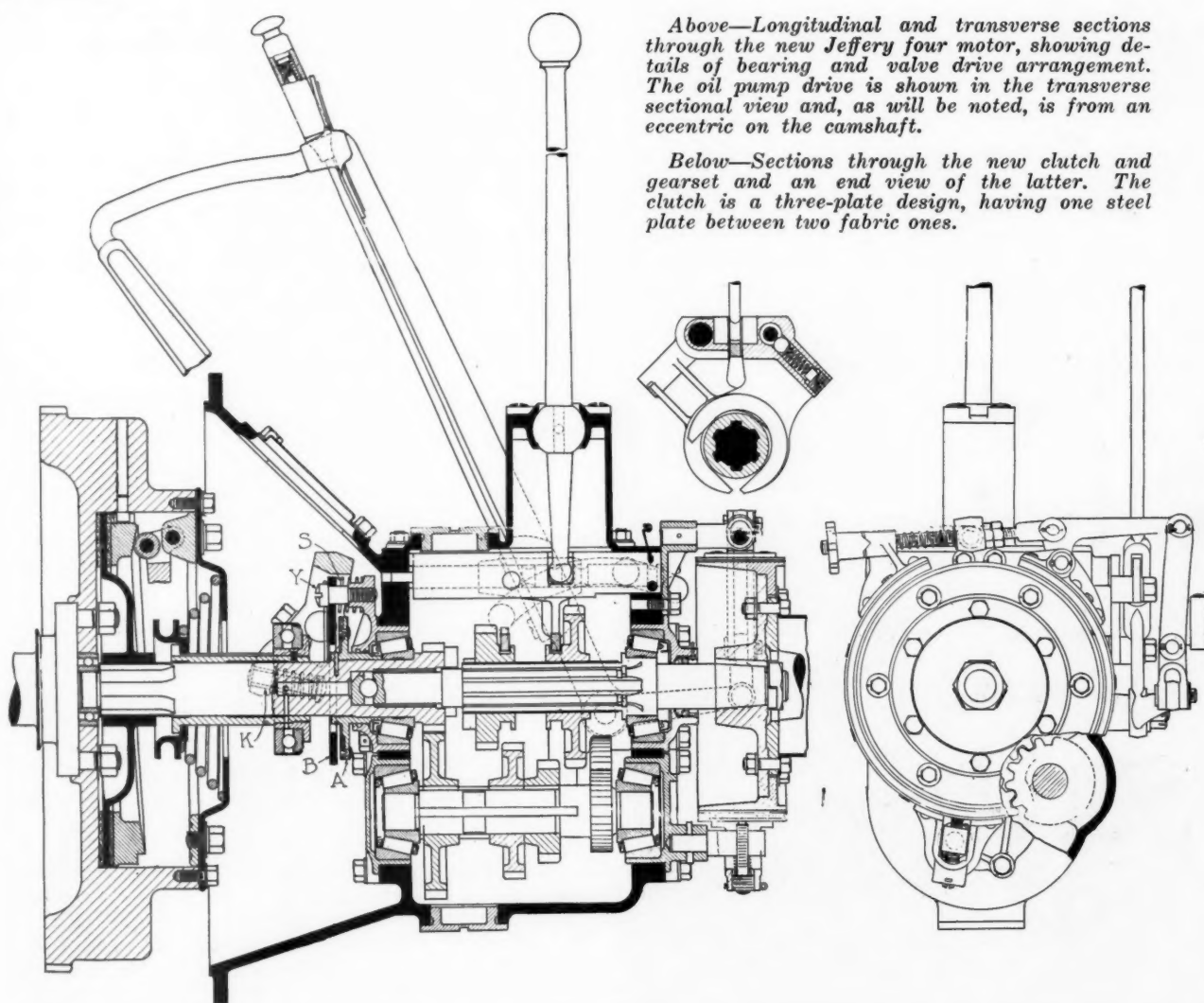


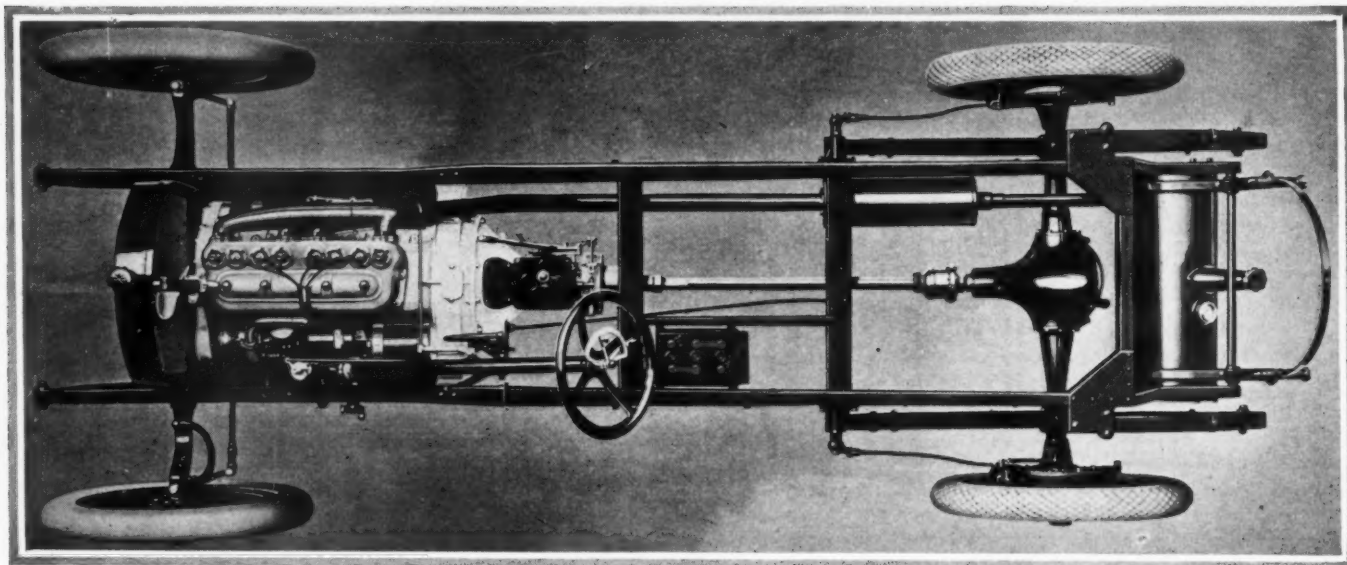
Features of the New Jeffery Four



Above—Longitudinal and transverse sections through the new Jeffery four motor, showing details of bearing and valve drive arrangement. The oil pump drive is shown in the transverse sectional view and, as will be noted, is from an eccentric on the camshaft.

Below—Sections through the new clutch and gearset and an end view of the latter. The clutch is a three-plate design, having one steel plate between two fabric ones.



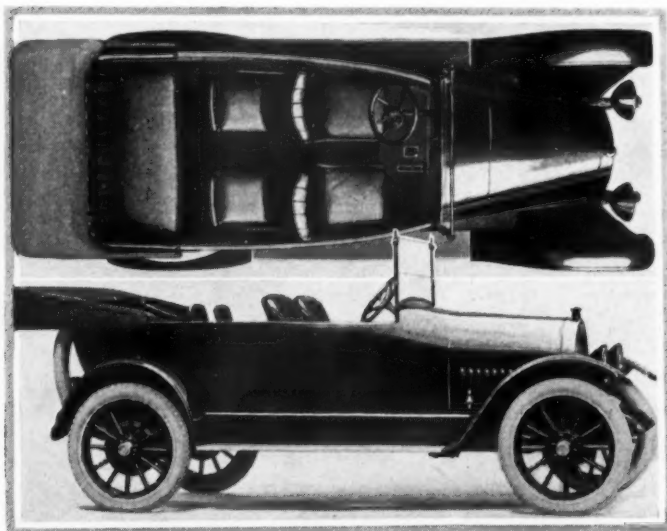


Plan view of the new Jeffery four chassis, showing strong, compact layout of the various units

In changing from the flywheel type of cranking and lighting system to the two-unit Bijur there has been made a saving in weight and power. The new system uses a U. S. L. 6-80 battery instead of a 6-12 volt 100, the smaller battery doing the necessary work in causing the starting motor to turn the engine over at 160 r.p.m. The old motor was turned at 250 r.p.m. which Jeffery engineers thought was too much, requiring too much current and showing no better results than the present system. The former starting system weighed 250 lb. including battery and this one weighs only 86 lb. with battery.

Operation of Bijur System

In the Jeffery application of the Bijur system the generator is driven from the timing gears on the right side and operates at one and one-half times motor speed. The regulation is inherent and it starts charging the battery at about 8 m.p.h. The cranking motor is on the left side and meshes with the flywheel by means of a mechanically shifted pinion. Pressure on the starting pedal causes the pinion to slide into mesh with the flywheel and at the same time connection is made with the battery so current flows through the starting motor. The reduction of cranking motor to engine is 11.6 to 1.



Plan and elevation of the four-cylinder, seven-passenger Jeffery touring car for 1916

With all of these changes, the Jeffery motor shows a higher revolution per minute than the former one and more power at that speed. On the test block it gives about 40 hp. at 1900 r.p.m. and it is stated it will run over that figure without reaching the peak of the curve.

The influencing factor in changing from separate gearset to unit power plant has been ease of assembly but there are others such as accessibility and cost reduction which have played a part.

The new clutch is a three-plate dry-disk with one steel plate and two faced with fabric. In connection with this clutch, which supplants the cone of last year, is a clutch brake of simple construction. As shown in the illustration herewith the main shaft has threaded to it the plate *B* which has fabric facing on a portion of its surface. Behind this plate is another spring backed plate *A* which is mounted so that it can slide freely on the bolts *Y*, of which there are three, spaced 120 deg. apart. In the clutch throwout collar *R* are two pins *K*. When the clutch is dis-engaged the throwout collar moves backward as shown by the arrow and after traveling a certain distance the pins *K* touch the plate *A* causing it to move forward and rub against plate *B* thus stopping the main shaft from rotating, and so stopping the clutch from spinning.

The clutch as a whole, gives better throttling performance than the former cone type and makes a better installation now that a unit power plant is used and the flywheel type generator removed. A feature of this clutch, which will appeal to the owner is that it may be adjusted for slipping, in 2 min.

New Three-Speed Gearset

Behind the clutch is a new three-speed gearset made in the Jeffery plant. This differs from the former one in that it has the main shaft below the shifter instead of beside it. This makes a cleaner installation. It is much lighter than the former four-speed and is fitted with tapered-roller bearings instead of ball. The gears are $\frac{3}{4}$ face nickel-steel, and the shift now is by center lever in a ball joint instead of by H-slot.

In the fitting of this new gearset the Jeffery company has applied a gearset brake which is adjustable in a few minutes and is accessible by lifting the front floor boards. This brake, because of its effectiveness is used as the emergency and is operated by the usual center lever. It uses fabric facing for the band which is $2\frac{1}{2}$ in. wide. The drum is 7 in. in diameter.

Continuing in the drive there is a hollow propeller shaft, of 1½ in. diameter instead of a solid shaft, 1¾, with two Kinsley-Bennett joints instead of joints of another make, and a new type of semi-floating rear axle instead of a floating. This axle is mounted on roller bearings instead of ball and is 50 lb. lighter than the former axle, thus reducing the unsprung weight. The shaft tubes are seamless steel and the differential housing, malleable iron. The gears within are spiral-bevel instead of straight bevel and the motor to wheel ratios are as follows: first speed, 13.49 to 1, second, 7.55 to 1, third, 4.15 to 1 and reverse, 17.97 to 1. One set of brakes are used in the axle and these act as the service set.

Drive Taken Through Springs

The propulsion members used in the 1915 car have been discarded and the drive now is taken through the rear springs, to simplify construction and save weight. To do this the shackle bolts have been increased from ¾ to 1 in. in diameter and the main spring leaves made of alloy steel. The rear springs have been lengthened to 54 in.

In the controls there is a Warner, Muncie, steering post instead of that used on the 1915 car, and as previously mentioned, a new gearshift lever. The light and ignition controls

have been simplified and rearranged on a new cowl board.

The body is an entirely new seven-passenger but is sold without the auxiliary seats thus making it a five-passenger. The body lines, like the Chesterfield of 1915, are conservative streamline and the unit is much better than the former one, has more taper in front and better curves on the sides. The front seats are separated and have a reasonably wide aisle between them, this being new for this car.

New One-Man Top

In the equipment there is a new one-man top instead of the regular type, a Carter fuel feed tank which converts pressure to gravity, instead of straight pressure with the tank at the rear, a circular-section tank instead of a square one and a new type of Rand windshield. Tires remain the same, 34 by 4, but they are mounted on Stanweld rims instead of those employed previously. In the instruments there is an oil gage which is new and a combination terminal board and fuse block in front of the cowl. With this fuse replacement is a matter of a few seconds even at night for a spare fuse is in the box and it may be replaced easily. The dash lights have been done away with and Solar dimmers placed in the headlights.

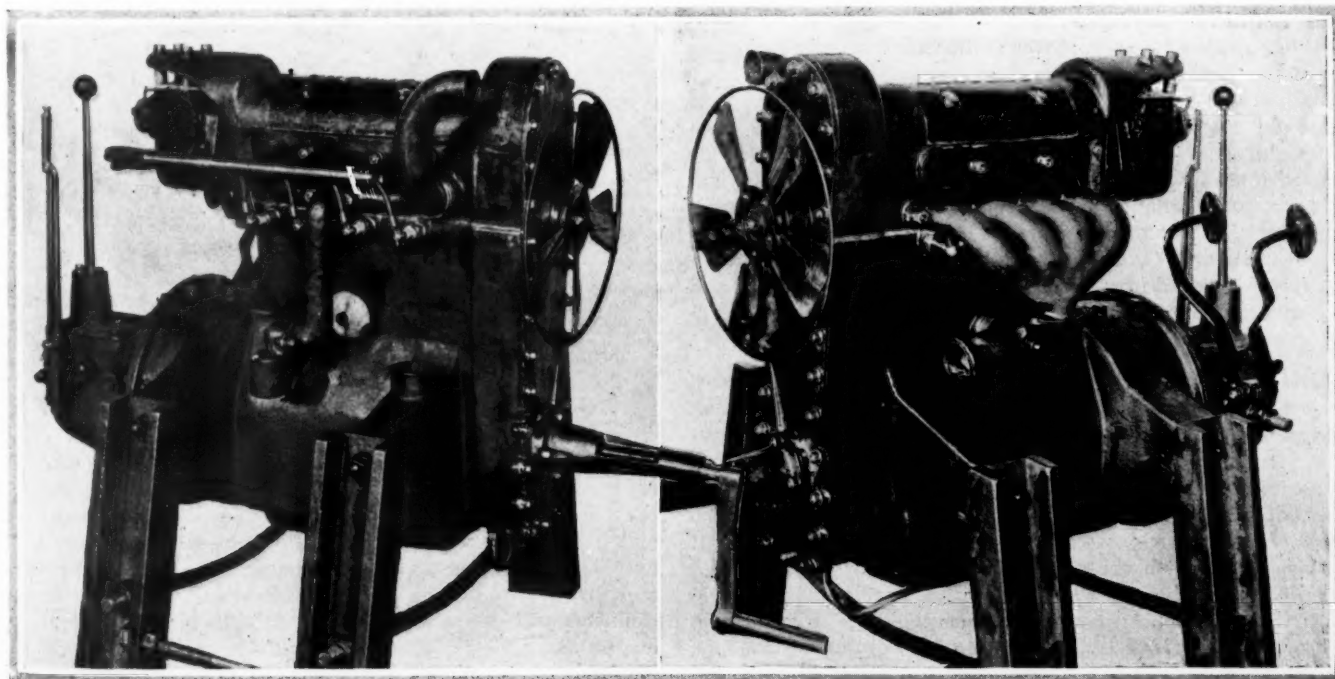
New Wollaston Valve-in-Head Motor

An overhead valve motor has been designed by the Wollaston Foundry Co., of Norfolk Downs, Quincy, Mass., which is in the business of making iron castings and doing electric welding. The motor, which is illustrated herewith, has an overhead camshaft running in a separate housing submerged in oil. Upon this shaft are four integral cams which operate the eight valves directly without the use of rocker arms. The overhead valves themselves are set in a removable head which has an inspection cover on either side allowing for accessible valve adjustments.

The camshaft is driven by silent chain on one motor and by vertical shaft and spiral gears on another, both of which are experimental jobs. Both systems work out satisfactorily.

Oiling is by force feed with the lubricant drawn from an aluminum oil sump by gear pump which forces the oil to the camshaft bearings, through the main bearings to the crankshaft and to the lower connecting-rod bearings. The oil sump is removable and the connecting-rods and pistons can be inspected or taken out through the bottom of the crankcase without disturbing any other part of the motor.

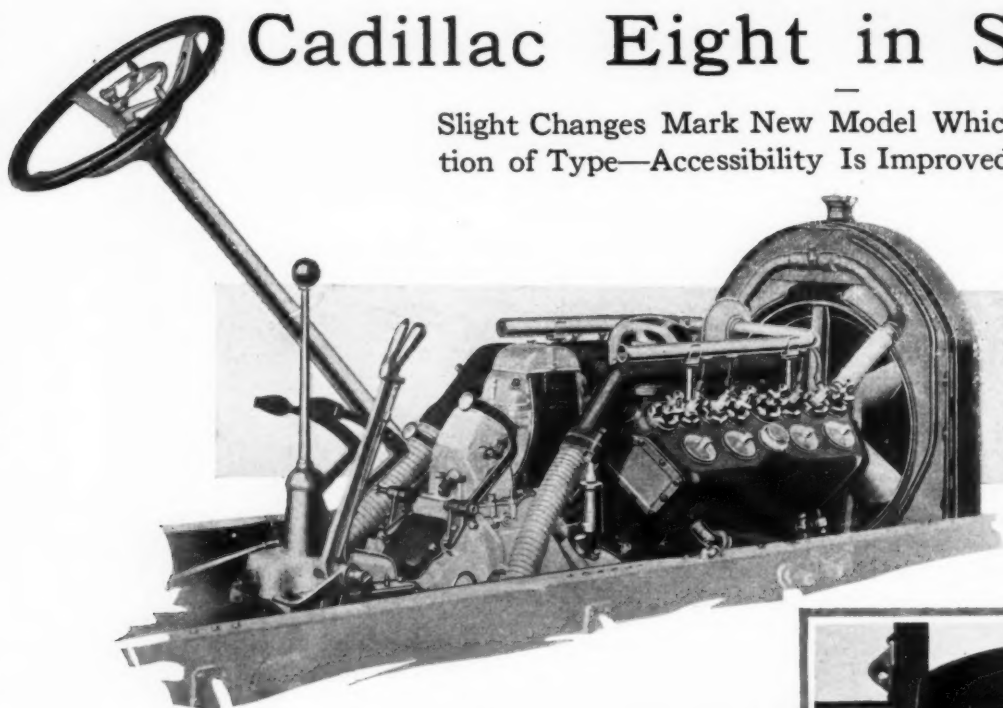
These motors are adapted to automobile use as is shown by the fittings of standard bell housings bolted to the rear end of the crankcase. The water connections are arranged to be adjusted to any angle and to suit any radiator connection. The motors illustrated are fitted with a Detroit Gear & Machine Co. gearset and clutch.



Both sides of the four-cylinder, overhead-valve Wollaston motor. The overhead camshaft runs in oil in a separate housing

Cadillac Eight in Second Year

Slight Changes Mark New Model Which Proves Satisfaction of Type—Accessibility Is Improved and Body Larger



Left—Fore part of 1916 Cadillac chassis, with the eight-cylinder motor installed. This view gives a good idea of the new style ignition leads which can be detached as a complete unit without loosening any nuts

Below—Plan view of the eight-cylinder motor in the 1916 Cadillac, showing the accessibility of the tappets, a feature of the refinements for the coming season. Note the mounting of the tire pump beside the gearbox

WHEN an absolutely new thing, like the eight-cylinder motor was a year ago, is first put upon a manufacturing basis, it is usual to find that the first year of real production will show up some weaknesses. With a car which was as great a change from previous models as was the eight-cylinder Cadillac it would be reasonable to expect some points of imperfection in the first model, however careful the experimental work, so the fact that the Cadillac eight is to enter its second season practically unchanged is really noteworthy. It means that the features which seemed good to the skilled men who tried out the experimental cars, have shown up well in the hands of many thousands of users who are a long way from being experts.

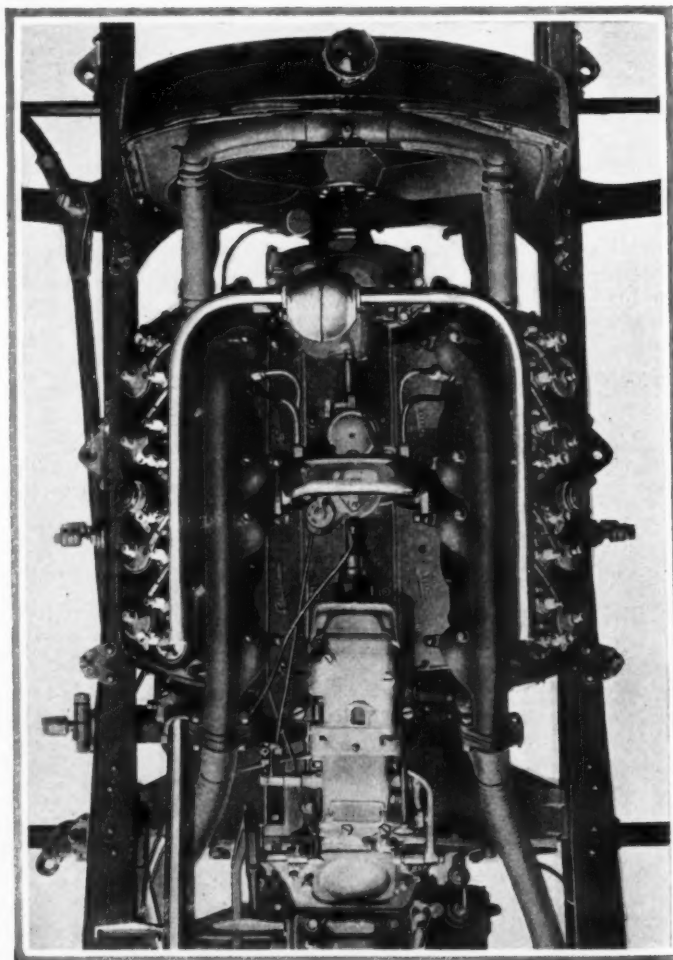
Few Changes Necessary

In a factory producing many cars, however good these cars may be, there are always some troubles, for it may be doubted if there is any machine in the world that is incapable of improvement. With new machines the troubles are usually more frequent and serious than with old ones and no doubt even the Cadillac has not been entirely free from complaints. The important thing is that no trouble has turned up which is due to any feature of the car, since had this happened changes would have been made. Thus one may say that the entrance into a second season with every single important feature of the chassis unaltered indicates a really remarkable foresight in planning both the design and manufacture of the car.

Price Increased \$105

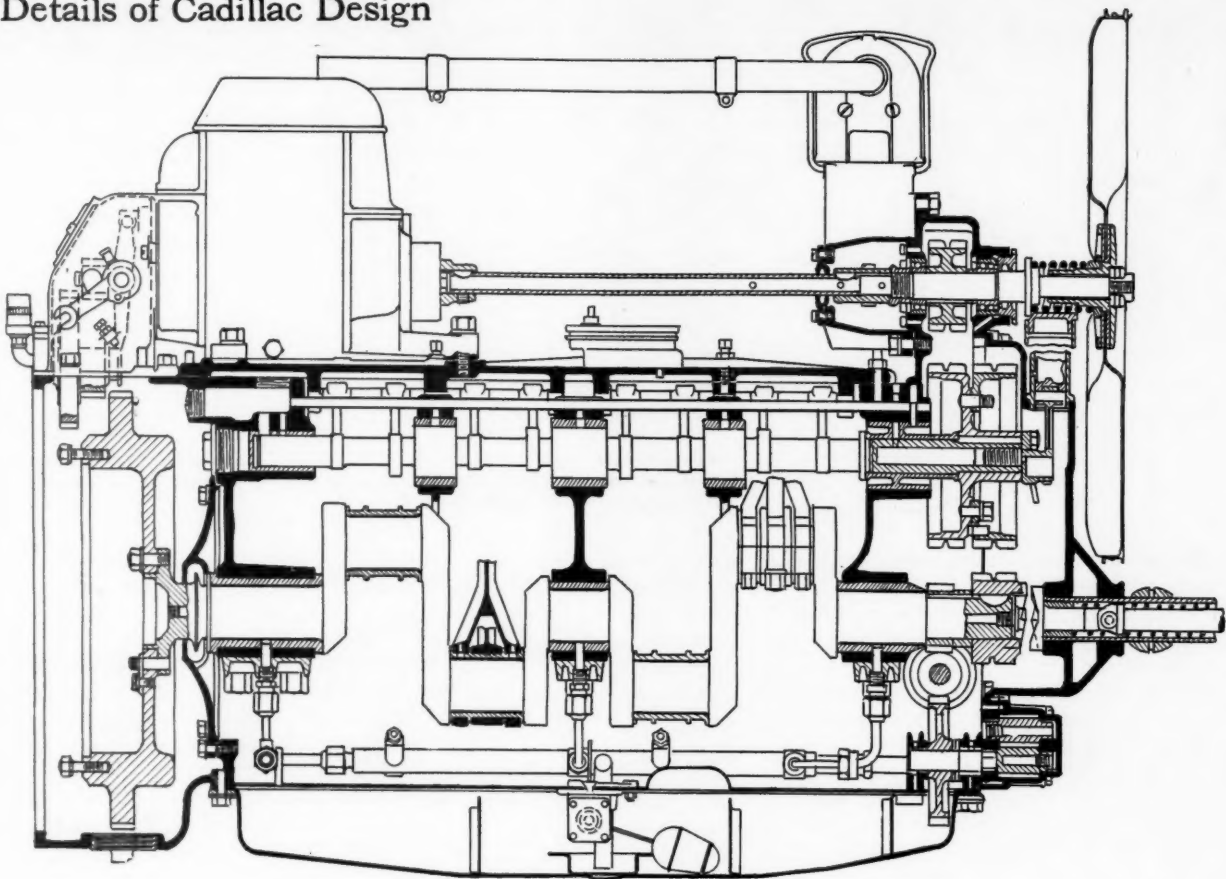
The Type 53 Cadillac will cost a little more than the original model, \$2,080 as against \$1,975. Five-passenger salon and seven-passenger bodies will be made for the coming season. Anent the price increase the company announces that the original price was fixed at a time when the production cost was not known, as the car was announced some considerable time before the plant was re-equipped to turn the eight. In accordance with the established practice of the company, no cut in the quality of the material has been considered and it is thus found necessary to raise the price in order that the margin of profit may be sufficient to give a reasonable business return to the stockholders.

The change in design that is most noticeable is directed

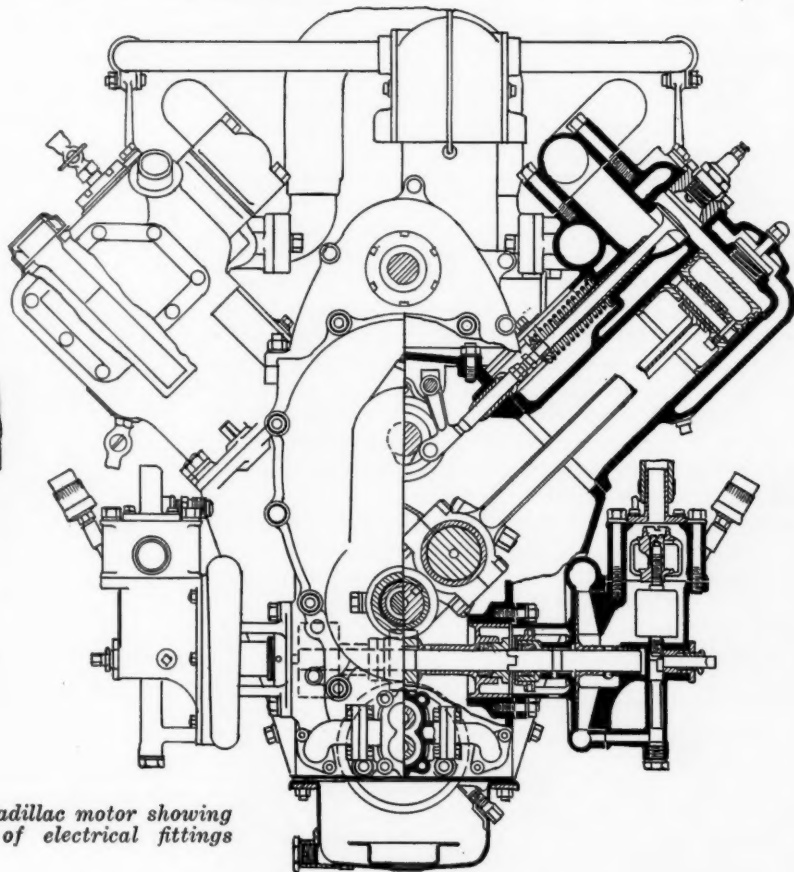
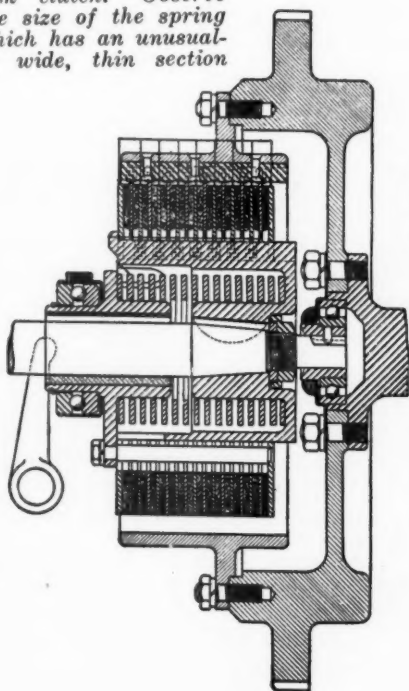


toward the improvement of the valve accessibility. On the old model it was perfectly possible to set a valve tappet, but the job was a little awkward to an unskilled mechanic. To make the task easier, the generator-and-starting-motor unit has been moved back a few inches, and the ignition breaker and distributor brought to the extreme front of the motor thus clearing the space between the cylinders of everything except the carburetor, because the tire pump has been removed from the motor altogether and is now located on the side of the gearbox.

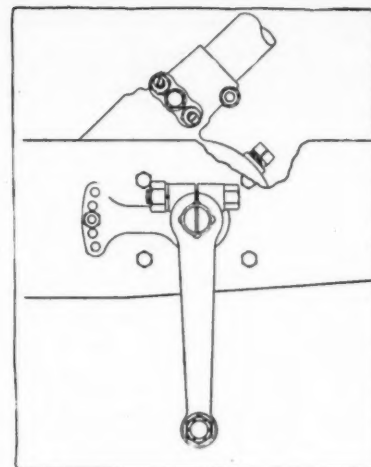
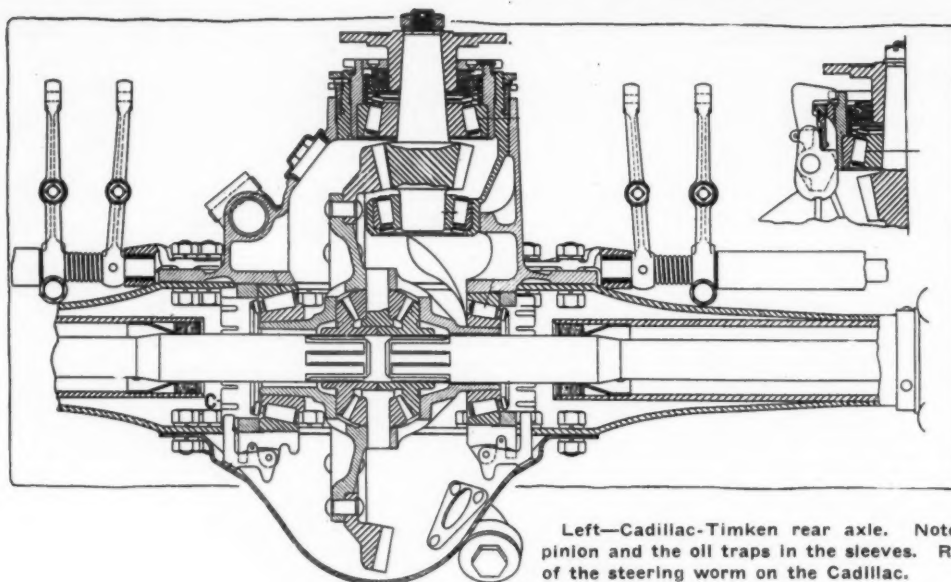
Details of Cadillac Design



The sixteen-plate dry disk clutch. Observe the size of the spring which has an unusually wide, thin section



Sections of 1916 Cadillac motor showing changed position of electrical fittings



Left—Cadillac-Timken rear axle. Note the substantial bearings for the bevel pinion and the oil traps in the sleeves. Right—Adjustment for setting the meshing of the steering worm on the Cadillac.

Also the exhaust manifolds have been raised and separated further by lengthening and curving the four branches on each which connect to the cylinder outlets. It is now possible to grind the valves and adjust them without removing anything except the plates which inclose them. Still, to render it less troublesome to remove the carbureter, the ignition wires have been redispensed so that they branch right and left at the distributor, instead of being taken to the old cross conduit on top of the intake manifold. The conduits are held in clips, and the aluminum casing which incloses the distributor is also secured by a spring wire hasp, so that when the ends of the leads are detached from the spark plugs, the whole high-tension system can be removed completely by simply pulling it off.

Second Speed Lowered

In the gearbox the only change is a slight lowering of the middle gear ratio, so as to give still better pulling power on the rare occasions when the lower ratio is needed.

The new location for the tire pump on the left side of the gearbox makes for convenience, as it is no longer necessary to raise the hood in order to utilize the pump. It is connected by means of a small sliding gear as before, and there is a small brass button with a screwdriver slot in it brought through a hole in, and flush with, the floor board of the driver's compartment. The air line is taken to the tool box where the flexible tube would be stored, so that the process of connecting up is rendered quick and trouble free. The idea in using a screwdriver to turn the gear shift button of the pump is that this tool always is to be found in the door pocket, and it is desirable not to add another pedal or to have any additional projection through the boards.

Another change which will be appreciated by tall adults, is that the adjustable clutch and brake pedals have been moved two inches forward, thus increasing the possible range of adjustment; and another thing which makes for the driver's comfort is the new location of the horn button in the center of the steering wheel.

Body Appears Much Larger

Using slightly higher hood and providing higher sides to the body has increased the apparent size of the open cars quite considerably. Actually there is a good deal more room inside, but this is obtained mainly by increased width. The rear seat is wide enough for three passengers of 200-lb. caliber and the folding seats are not uncomfortable for anyone of normal or even a little over normal size. For upholstery an excellent quality of hand buffed leather is

being used. Despite the greater accommodation it is said that the weight has been only slightly increased.

More Power Available

What might be called a settling down in the manufacturing of the eight has resulted in a slightly higher average motor power and the engines coming through lately have been giving a very good account of themselves. One little addition to the carbureter no doubt is partly responsible, as it is also for some slight improvement in the gasoline consumption. This consists of a small shutter which is attached to the throttle operating rod and varies the size of the air intake in proportion to the throttle position, the control being quite separate from the usual air valve, which is the same as before. The action of this shutter is to decrease the atmospheric pressure on the gasoline in the carbureter bowl at certain throttle openings and to decrease the amount of gas freed through the spray nozzle at certain engine speeds.

Unchanged Features

To deal exhaustively with so well known a car would be absurd, except to point out the main features which it has vindicated. First of these is, of course, the eight-cylinder motor from a quantity production viewpoint, for if Cadillac did not *invent* the eight it certainly *created* it.

Second is the high-speed system of light reciprocating parts, big valves with a quick lift, horsepower peak at a rate of revolution approaching the 3000 mark and so on. Nobody before the coming of the Cadillac had attempted to apply these principles on such a wholesale scale, or to so large a motor, measuring by piston displacement.

Third may be put the very low high-gear ratio which enables the revolution possibilities of the motor to be utilized at practical road speeds, for here again Cadillac was a pioneer. The speed of the motor at a thirty-mile-an-hour road speed is higher than that of any European car, yet the engine has not suffered on account thereof.

Manufacturing Problems

No secret is made of the fact that Cadillac would have liked to make many more cars than it has been able to do, since first the eight program was commenced, but it is easy to realize how large an undertaking it was to equip the plant for the manufacture of a totally new kind of product. H. M. Leland has given some figures concerning this reorganization which show what large sums are involved in the development of an utterly new type of car and the amount of shop work to be done before the decks can be cleared for action. He says that the first three engines made for experi-

mental purposes cost \$46,000 not including anything for overhead charges; and that the first three experimental cars cost \$63,000 or \$21,000 each.

In tool equipment the changes in the motor department called for 269 new machines costing over \$180,000, and small tools like drills and cutters numbering over 50,000 by a wide margin. Add to this the clearing out of old equipment and the installation of the new and it follows that the cost of getting ready to commence manufacture must have been at least over \$500,000.

From the engineer's viewpoint some figures of Mr. Leland's relating to drafting-room work will be interesting. The number of experimental drawings made was 1922, the total number of drawings up to March of this year, when production was in full swing, totaled 2283 and the number of tool drawings was 10,869. Of blueprints the total number made was 223,175 using 38½ miles of paper, and figuring on a normal day it would take one man sixty-four years to make the original drawings.

Over 10,000 Parts

In the whole Cadillac car there are, says Mr. Leland, more than 10,000 parts if those in the electrical apparatus are considered.

Practically No Motor Changes

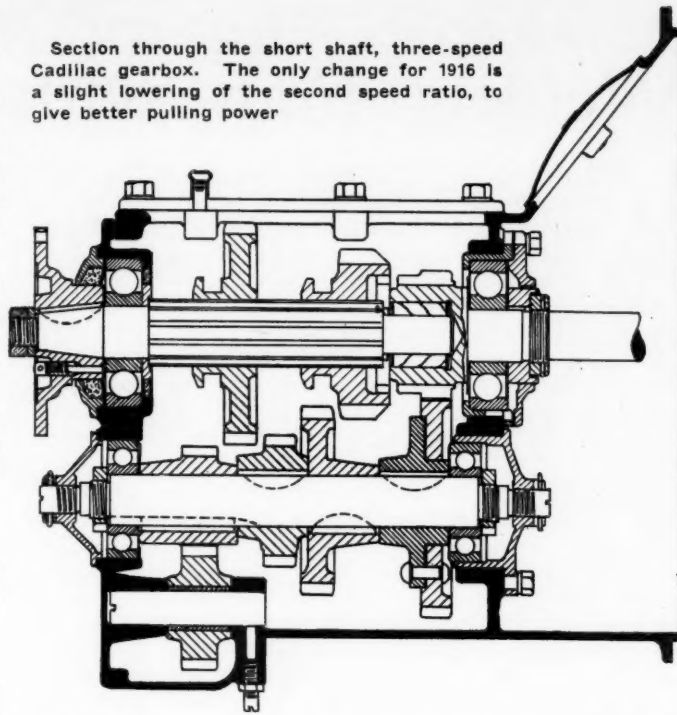
In the illustrations the changes are shown in the photographs and the new designs can be studied also in the drawings which lay bare almost every portion of the motor. Here the only change besides the redistribution of the accessories consists in bringing the flywheel ring gear to the central plane of the wheel, so as to allow the generator and starting motor to be moved aft. The fan shaft housing altered to suit the new location of the distributor and to provide a drive for the latter.

Just to recapitulate the unaltered motor specification, the dimensions are 3.125 by 5.125 giving a displacement of 314 cu. in., the forked type of connecting-rod is used, and there are only eight cams for the sixteen valves. The fact that this construction has not been altered in the least is interesting, because it has several times been suggested that the sixteen-cam motor with rocker arms eliminated was easier to build.

At the front end one wide, silent chain drives the camshaft, and a second chain takes care of the fan spindle and distributor drive, while the oil pump is driven by a skew gear direct from the crankshaft, being thus located at the extreme front end of the crankcase. The intermediate gear which lies between the crankshaft and the oil pump is on a cross shaft that has a water pump at either end, and the water circulation is controlled by thermostat.

On the gearshaft is mounted a sixteen-plate disk clutch, and this bolts to the flywheel when the bell housing is attached to the crankcase, it is a dry-plate type with alternate steel and wire mesh asbestos fabric surfaces and is sufficiently easy to operate to render starting from rest in high gear quite smooth. The gearset has no peculiarity, being just a robust three speed type with annular ball bearings. For the rear axle a Timken design is employed, certain parts,

Section through the short shaft, three-speed Cadillac gearbox. The only change for 1916 is a slight lowering of the second speed ratio, to give better pulling power



such as the spiral bevels, being made in the Cadillac plant. The propeller shaft is an open type with two universals. Drive is taken through the springs, but not torque, as a special stay is provided.

For the front axle and steering gear the detail work is very thorough and the bearing surfaces provided well up to the high speed work of which the car is capable. One little detail that often escapes attention is the adjustment for meshing the worm with the worm wheel in the steering box. As shown in the drawing, there is a small lever alongside the steering arm, locked to the frame side by a small bolt which can be passed through any one of five holes. Moving the lever oscillates an eccentric bushing on the worm wheel shaft and so sets the depth of tooth engagement. It is, of course, the sort of fitting that only comes to be appreciated after the car has been in use for a year or two, but it is very valuable then.

Great Reliability of Ignition

Almost needless to say, the electrical apparatus is all Delco and consists of the latest variety with no changes in principle from the outfit belonging to the former type. In the distributor the low-tension breaker has two blades which are joined up in parallel to halve the amount of current passing between the sets of contact points.

To complete the specifications: wheelbase is 122 in. and tires 36 by 4½ in. all around, and 56 in. is the standard tread though 61 in. tread can be obtained if desired. Gasoline feed is by air pressure supplied from a pump on the motor to a 20 gal. tank at the rear. Added to the five outside lamps and the dash lamp, the 1916 car has an opal glazed tonneau light, a Waltham clock and an inspection lamp. Recapitulating the prices, the seven-passenger touring car, the five-passenger salon and the roadster, each cost \$2,080, the five-passenger brougham \$2,950, seven-passenger limousine \$3,450 and Berlin \$3,600. A type that ought to be very popular is the three-passenger victoria, which has a most beautifully finished and fitted body with a leather top. The seating is arranged with the driver a few inches forward of the two passengers, who sit side by side and have plenty of width. This car costs \$2,400 and, being either wide open or all closed at will, should be well worth the extra \$320 to any man who does not want to carry more than three.



1916 Cadillac seven-passenger touring car. Note straight top line. There is a new mud flap in front below the radiator protecting the water pumps from splash

Weidely Four with Aluminum Pistons

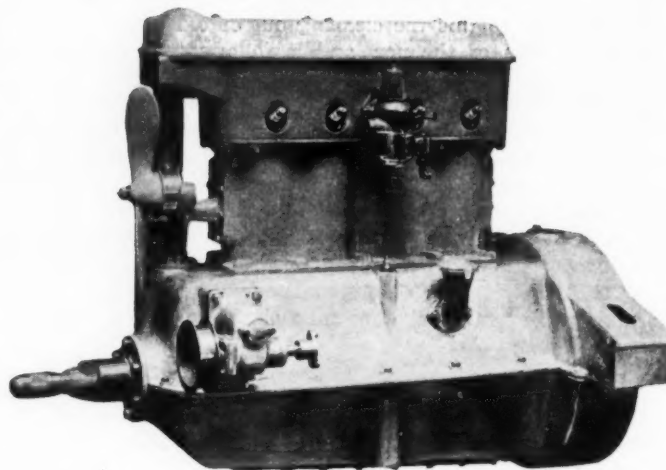
LIKE the six, the new Weidely four has all the valves in the head, without cages and operated by a camshaft lying above the cylinders, which camshaft is driven from the crankshaft by a vertical shaft, at the front, through worm gears, spirals at right angles, and the whole mechanism, shafting, gears, camshaft and valves completely inclosed and abundantly supplied with lubricant.

The cylinders are cast in a single block, the head likewise is cast integrally for the four cylinders and attached to the top of the cylinder block. Instead of casting the cylinders integrally with the upper half of the crankcase, as in the case of the older motor, this motor has them bolted to the upper half of the crankcase which is of aluminum instead of cast iron. This makes a better looking and much lighter construction. Practically all the water pipes and manifolds have been eliminated by the adoption of this style of casting.

The cylinder dimensions are $3\frac{3}{8}$ by $5\frac{1}{2}$, displacement 196.81 cu. in. The valves are exceptionally large for a motor of this capacity, especially as they are in the cylinder head. The outside diameter of the valves measures $2\frac{1}{16}$ in., and the clear opening is $1\frac{1}{8}$ in. The valves have a lift of only $\frac{9}{32}$ in. and are very short and light, weighing only 5.9 ounces each. This makes for a very smooth running and noiseless valve gear. There are no cages for the valves so the seats are efficiently water cooled. Each valve overhangs the cylinder bore slightly so that in the event of any breakage of the valve stems the valve head would not fall into the cylinder.

Valve Side Thrust Eliminated

No rocker arms are used, the camshaft being directly above the ends of the valve stems; but between the cams and the stem ends is a very light drop forged steel finger pivoted



Exterior view of Weidely four with side outlet carburetor

at the other end. This carries the adjustment by which the wear can be taken up and at the same time eliminates all side thrust on the valves due to the angularity of the cams.

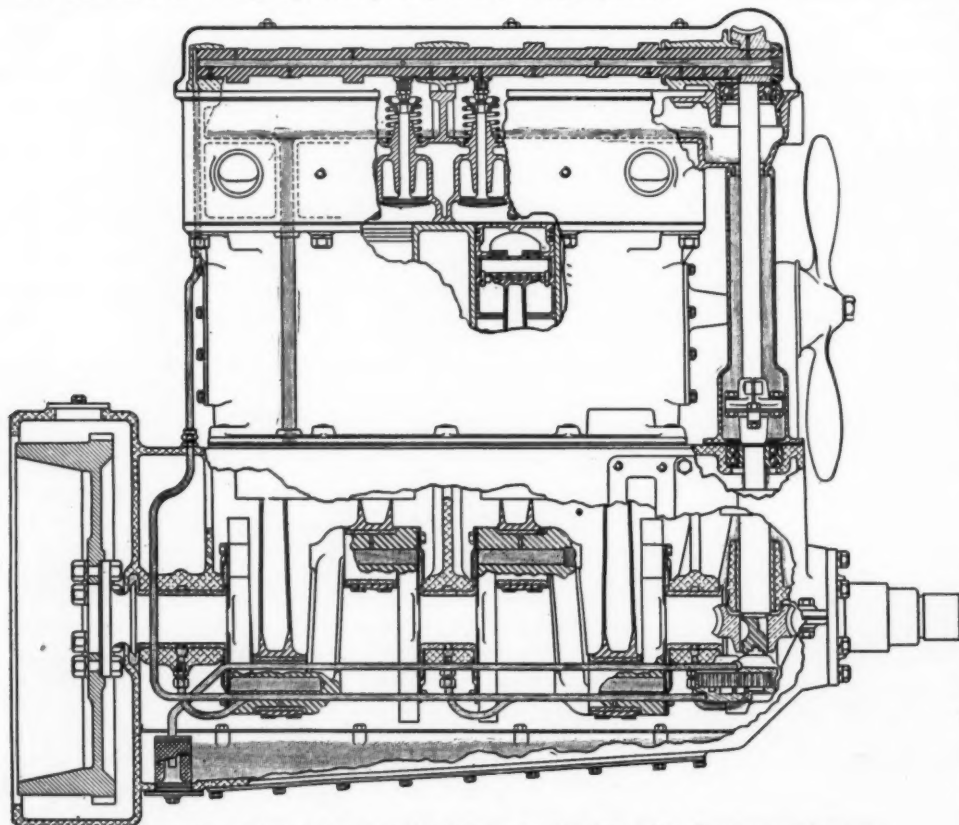
Tubular Connecting-Rods

The use of aluminum pistons and three-piece tubular connecting-rods is standard. The three pieces are electrically welded together. The pistons are also very light, weighing only 17 ounces with the piston pin in place. The latter is $\frac{7}{8}$ in. in diameter and fastened into the piston.

The crankshaft is counterbalanced to offset the vibrations which occur at high engine speeds. The main bearings are oiled by force feed but the crankpins receive oil through the banjo rings which are attached to the cheeks of the cranks.

The flow of oil in these is governed by the speed of the engine as centrifugal force throws the oil from the rings into the pins. A 5-in. flange is provided at the rear end of the shaft to fasten the 16-in. pressed or rolled steel flywheel. On a high speed type of engine steel has been found necessary for perfect safety. It also provides material for the starting gear. The main bearings are all $2\frac{1}{8}$ in. in diameter and from front to rear have the following lengths, $2\frac{7}{16}$, $2\frac{1}{2}$ and 4 in. The connecting-rod bearings are 2 in. in diameter and $2\frac{1}{4}$ in. long.

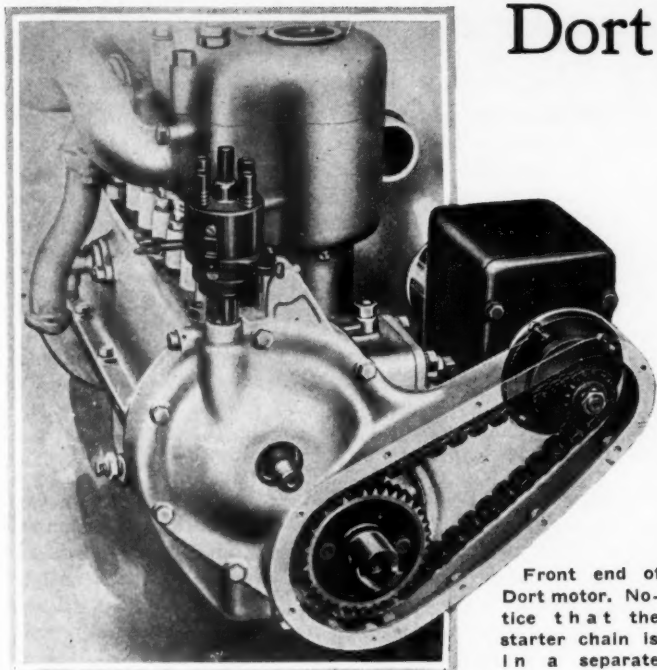
The oil pump is located in the bottom of the case and draws its supply of oil through a screen in the sump. The two gears of the pump are of different size; the larger one serves as a distributor and forces the oil through four separate leads, three going to the main bearings and the fourth to the hollow camshaft. The latter is drilled through on the back of each cam so that each valve and its mechanism runs in a bath of oil all the time.



Part sectional view of the new Weidely four, showing drive of valve mechanism

Dort Continues Roadster and Touring

Prices Reduced and Electric Starting and Lighting Fitted as Standard Equipment for 1916



Front end of Dort motor. Notice that the starter chain is in a separate case

ROADSTER and touring car models made by the Dort Motor Car Co., Flint, Mich., for 1916, show no changes in design over the 1915 types. The price of the touring car, however, has been reduced to \$650 with full equipment, but the roadster still costs \$540 with electric starting and lighting. Up to this time, the touring model has sold for \$680 without starting apparatus or demountable rims. As the new price includes these, and they previously added \$60 to the price, the real reduction figures to \$90.

These Dort cars, which have a number of special features about them, are completely designed by the concern's engineering department. Though the firm name is comparatively new to the industry, the first models having made their debut at the national automobile shows this year, the Dort company is really composed largely of the same stockholders as the Durant-Dort Carriage Co., which has been prominently connected with the carriage industry for 28 years, it is said. In fact, a great deal of the manufacturing is done in the same plants, so that the Dort machines really come from an established manufacturing organization, and the taking on of motor vehicle manufacture is but a logical step.

Models Similar in Design

So far as general design is concerned both the roadster and touring car follow the same lines, although the roadster chassis is shorter and lighter and its motor is smaller. The idea has been to adapt each chassis specially to the class of service it is called upon to deliver. Naturally, a roadster does more running around and it can very logically be built lighter to promote economy of operation.

The touring model, in which a test run was made, has an exceedingly sweet-running power plant which handles the machine in excellent shape with a surprising lack of vibration and noise. Of moderately high-speed type, this motor proved itself to be very flexible, coming down to a 4-mile gait without any hesitation and holding it, with rapid accelerative possibilities to above 50 m.p.h. There are several constructional features of the engine which undoubtedly have a bearing upon its performance, and these will be mentioned later.

Reviewing the specifications, the touring car, known as model 5, has a 3 3/4 by 5 motor, wheelbase of 105 in., cantilever rear springs, cone clutch, three-speed center control gearset, three-quarter floating rear axle, and 30 by 3 1/2-in. tires. The roadster is fitted with a 3 by 4 engine, follows

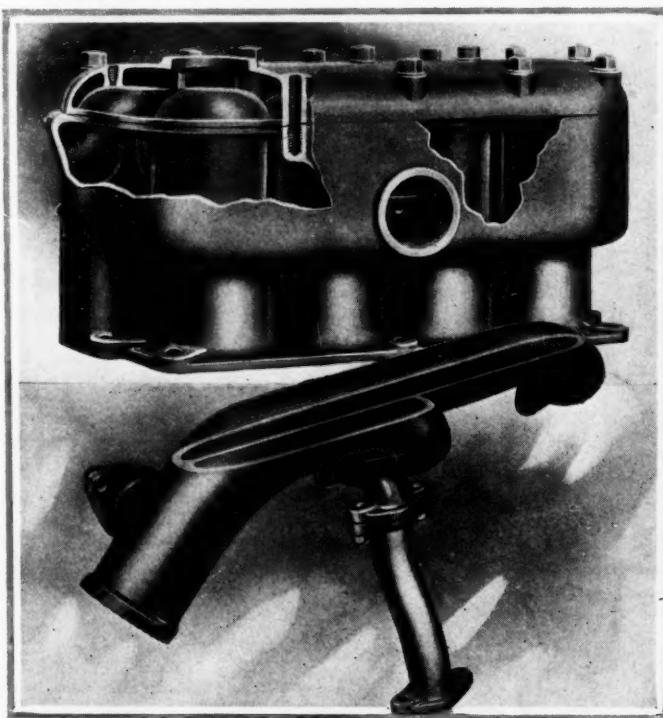
out the same general specifications, and its wheelbase is 92 in. This car is designated as model 4.

Detachable Cylinder Head

The Dort motor used in the touring car is capable of 20 hp. at 1000 r.p.m., while at 1600 r.p.m. it develops 28 hp. It is rated at 16.9 hp. S. A. E., and the displacement is 165.9 cu. in. The unit power plant construction is carried out with the gearbox and clutch attaching to the engine proper and all being supported on three points. Somewhat unusual is the use of a detachable cylinder head along with separate aluminum crankcase. Ordinarily when the head is made detachable, the cylinders and upper half of the crankcase form one piece, but the Dort design should be lighter through the use of more aluminum.

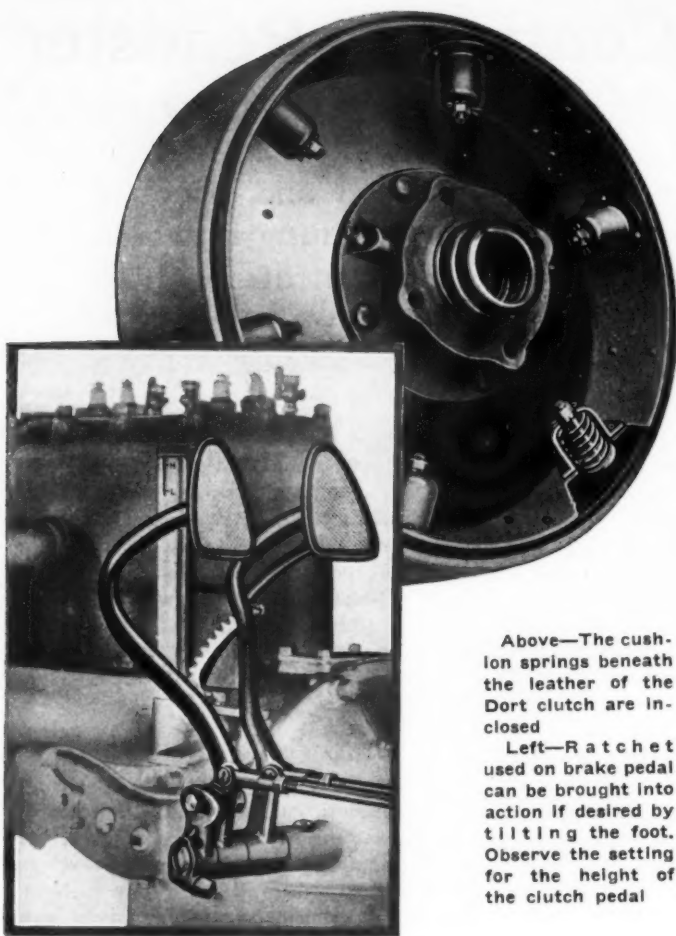
A striking feature of the motor is the use of an extra heavy crankshaft for its size, this serving as a big factor against vibration. It is a drop forging of 0.40 to 0.50 carbon steel and 1 3/4 in. in diameter, supported by two main bearings. Likewise the connecting-rods are forged from the same steel, and accurate balance of all of the reciprocating parts is said to be demanded to within 1/4 oz. Long pistons are fitted, these serving to distribute the wear and reducing it to the minimum. Three rings are used on each piston, all above the wristpin.

The valve outfit does its part in giving the motor its high power. They are of large size—1 11/32 in. in the clear—



Upper—Cylinder block of Dort motor showing the extra large water spaces

Lower—Special exhaust manifold which separates the discharge so that from one cylinder does not interfere with free outlet from the next



Above—The cushion springs beneath the leather of the Dort clutch are inclosed

Left—Ratchet used on brake pedal can be brought into action if desired by tilting the foot. Observe the setting for the height of the clutch pedal

and have a lift of $\frac{1}{4}$ in. In their makeup, carbon steel stems are welded to the cast-iron heads, the two-bearing carbon steel camshaft operating them through the intermediary of mushroom lifters.

Motor dimensions follow:

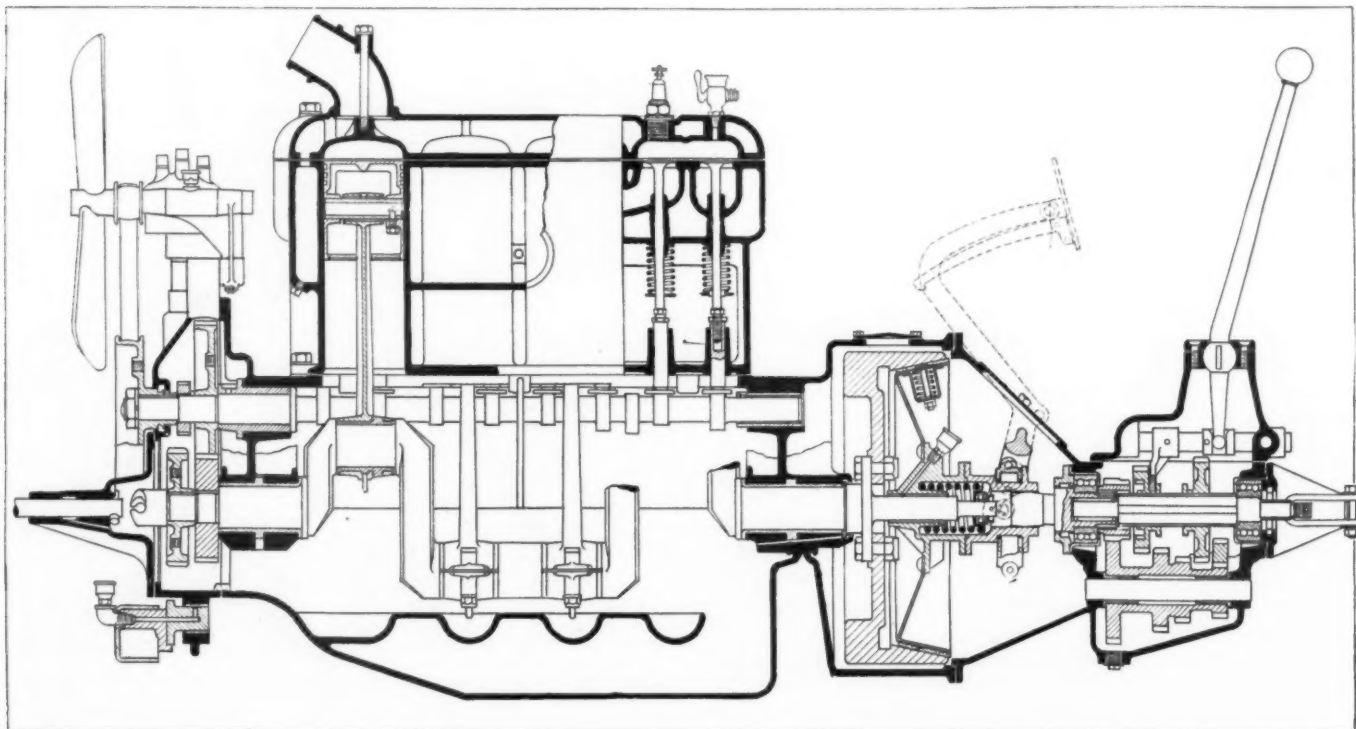
| | Model 5—3 1-4 by 5 | Model 4—3 by 4 |
|--------------------------|--------------------|------------------|
| Front crankshaft bearing | 1 3-4 by 3 5-16 | 1 3-4 by 2 11-16 |
| Rear crankshaft bearing | 1 3-4 by 2 11-16 | 1 3-4 by 3 7-16 |
| Front camshaft bearing | 1 1-4 by 2 31-32 | 1 1-4 by 2 1-4 |
| Rear camshaft bearing | 1 by 2 31-32 | 1 by 2 27-32 |

Special attention has been given to the matter of uniform waterjacket space around each of the cylinders of the motors. The detachable head feature helps in this respect, for it permits of the making of accurate casting, so far as the waterjacket thickness is concerned. Equal spacing is secured all around each of the cylinders, making for uniform expansion of the cylinders all around with no distortion, which is apt to happen if cylinders Nos. 1 and 2 and Nos. 3 and 4 are close together, for instance. This unequal spacing, with the two front and the two rear in groups is sometimes found, and naturally expansion cannot be uniform in such a block arrangement.

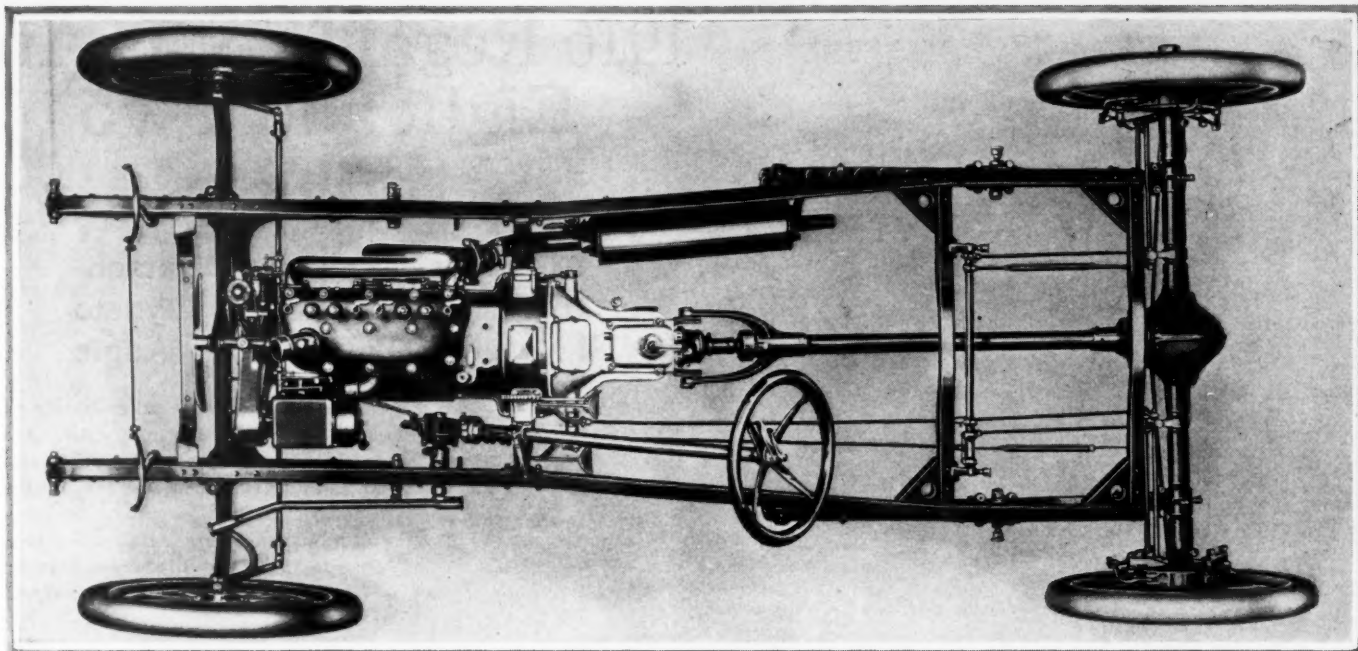
Double Exhaust Manifold

Unusual in four-cylinder construction is the double exhaust manifold, also. This is on the same order as the double designs often used with sixes, only instead of three cylinders exhausting into each passage, two cylinders use each outlet. The two passages are cast integrally with an inner wall between them. The object of the design of manifold is to prevent any back pressure in the motor. Cylinders Nos. 1 and 4 exhaust in one passage and Nos. 2 and 3 in the other. As the firing order is 1, 3, 4, 2, there is no possibility of exhaust gases from one cylinder running into the flow of gases from the preceding cylinders. In short, free outlet is assured.

Dort motors are lubricated by the constant circulating splash arrangement, whereby a pump operated from the camshaft draws oil from the reservoir at the bottom of the motor and forces it to the front gear casing, from which point it flows to the troughs under the connecting-rods and is picked up by the dippers on the ends of these. This serves to splash the oil to the main bearings, rod bearings and all other friction surfaces. Convenience for the driver has not been overlooked in the location of the oil gage which is combined with the breather. Placed on the left rear side of the crankcase, this combination is really a tall standpipe, with the indicator brought almost to the top of the cylinders,



Section of Dort Model 5 touring car power plant. Motor is 3.25 by 5 in. and has a detachable cylinder head



In this chassis plan of the Dort model 5 the frame is widened so that the cantilever springs are located beneath the side rails

making it easy to read the lever without getting the head down under the hood.

The Electrical System

The electrical system has for its main unit an Apple motor-generator carried on a bracket on the left forward side of the engine and driven by an inclosed silent chain from the crankshaft at a $2\frac{1}{2}$ to 1 ratio. A simple adjustment of the chain is provided so that the chain centers can be varied.

A neat cone clutch has been designed for these cars. This has a leather-faced pressed steel cone with six compensating spring plungers pressing upon the leather at equal intervals around the circumference, and making for an easy action of the clutch on engaging. Each of these spring plungers is inclosed within a cup pressing which is attached to the cone, and the ends of the plungers extend through the cups to admit of adjustment of the spring tension. They carry adjusting nuts, held in place by cotters. The clutch pedal engages and disengages the clutch through a hollow phosphor-bronze collar, which is so arranged as to be kept constantly filled with grease through the fitting of a tube running to the outside of the gearcase so that it is an easy matter to reach the large grease cup supplying the collar through this tube.

In fact, lubrication of the gearset is well cared for, as a small elbow is fitted, this making it easy to put in the transmission oil. In the internal makeup of the gearset there is nothing departing from the conventional. The gears and shafts are formed from nickel steel, and the mainshafts run on ND bearings.

From the power plant, the drive system is still strictly Dort design throughout. Fitted with a universal just back of the gearbox, the driving shaft then enters a substantial torsion tube, the front end of which is of yoke form. The arms of the yoke are carried in brackets on either side of the gearbox end, and with freedom of end play to the extent of $\frac{1}{4}$ in., this to take care of axle variations.

Axle Bearings Easily Adjusted

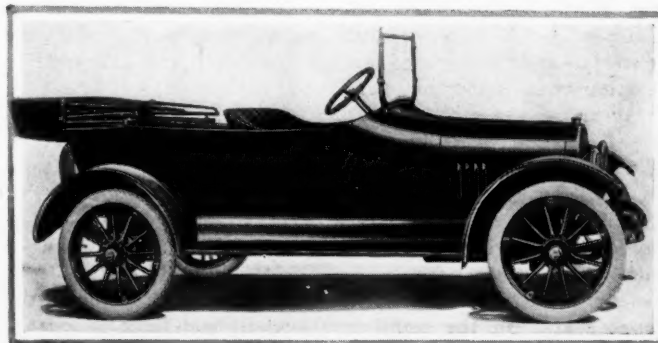
A special feature of the rear axle construction is that all bearings are adjustable from the outside, which is a point that cannot be too highly commended. In addition a special opening has been provided in the housing to enable the driver to see that the bevel gears are properly meshed. To allow for this external adjustment, a pin passes through the hous-

ing to a groove in the bearing carrier, and when this is unscrewed, the carrier can be turned through the opening in the housing thus made, bringing another groove into position for locking with the pin when the latter is again screwed into place. In the construction of the axle, differential gears are made of nickel steel, and propeller and differential shafts are of chrome nickel. The propeller shaft is carried on ND double and single-row bearings, with the differential and wheels running on Hyatts.

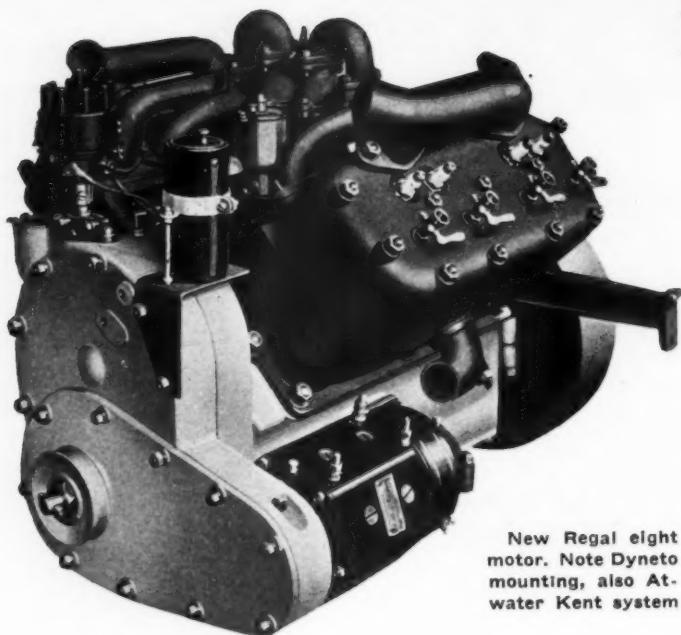
One Pedal for Clutch and Brake

Brakes are 10 in. in diameter with the service set external contracting and the emergency internal expanding. The service brake operates from the clutch pedal. Pushing the pedal halfway disengages the clutch, and further movement acts upon the brake. The emergency brake system is operative from the other pedal with a ratchet holding it in place when required. To release this brake, the lower part of the pedal is pushed, causing the ratchet to let go. By this arrangement of the brake controls, a second lever beside the gear change lever is eliminated.

Cantilever rear springs are well applied to these cars. The springs are of the full type, shackling at the front to the frame, and having a trunnion attachment at the center. They measure $50\frac{1}{4}$ in. long by 2 in. in width on the touring car and $45\frac{1}{4}$ by $1\frac{3}{4}$ in. on the roadster chassis. Front springs are conventional half-elliptics. In appearance, the Dort models are very attractive, with hood sloping in unbroken curve from the cowl.



The Model 5 Dort touring car has a clean cut appearance



New Regal eight motor. Note Dyneto mounting, also Atwater Kent system

AS announced recently, the program of the Regal Motor Co., Detroit, Mich., comprises two fours at \$650 and \$985, and an eight at \$1,200. Of these the big four is practically identical with the 1915 chassis described on page 1277 of *THE AUTOMOBILE* for June 18, 1914. The main change is in the electrical equipment which is now a Dyneto single unit combining the functions of lighting and starting. Ignition is cared for by an Atwater Kent automatic advance distributor located at the front end of the camshaft as in the last model. Of course, the Dyneto does not need a flywheel drive since it lights and starts on the same gear ratio, so it is driven by a chain from the front end of the crankshaft. This chain has an aluminum case which holds lubricant, and there is a simple adjustment for chain tension, the generator being mounted on a rocking pivot so that a turn of a nut suffices to set the centers.

This Dyneto outfit is used on the eight and on the small four also, the mounting being practically identical with the same means for adjustment. In the case of the eight it is not placed between the cylinder blocks, but is attached to the crankcase very much as on the fours, so its comparatively large size does not interfere with valve accessibility.

Turning to dimensional detail, the smaller four has a bore and stroke of $3\frac{1}{8}$ by $4\frac{1}{4}$, the large four $3\frac{1}{8}$ by 5 and the eight 3 by $4\frac{1}{2}$ in., giving displacements of 134, 221, and 254 cu. in. respectively. The wheelbase of the light four is 106 in., and that of the other two cars 112 in., while the tread is 56 in. in each case. Naturally the light four has a smaller body than the larger model, but the eight and the large four have almost the same body equipment.

As regards the chassis detail, the smaller car differs from the other two which are alike, but it is pointed out that the cheapest car is merely a little more simple in outline as the material and parts used are thoroughly good and well in keeping with Regal quality.

As before the standard or large four is made in the Regal plant but the small four and the eight are the New Port Huron motors, so the eight is more like the new four than it resembles the old one. All three engines have detachable cylinder heads covering valves arranged in the normal manner and a Stewart carbureter is used for each, with the addition of a vacuum feed except for the light four, the latter having a gasoline tank in the cowl, instead of beneath the front seat. On the eight the vacuum feed tank is located under the dashboard so it is accessible from the back. In this position it occupies space that would otherwise be wasted

1916 Regal Line Is An Eight and Two Fours

All Three Motors Have Detachable Cylinder Heads—Dyneto Fitted—Valves in 8 at Angle

and its absence from under the hood aids the accessibility of the motor. As for accessibility, on the Regal motor the tappets could all be adjusted without removing any part, and if the carbureter were removed together with the intake pipe the job would be really easy. The removal of the carbureter is, in itself, so simple a proceeding that most men would take it off if they were about to set the whole sixteen tappets, though if it was a question of one or two only it would not be worth while.

On the fours the accessibility is marked and the placing of the carbureter on the valve side does not interfere with the valves.

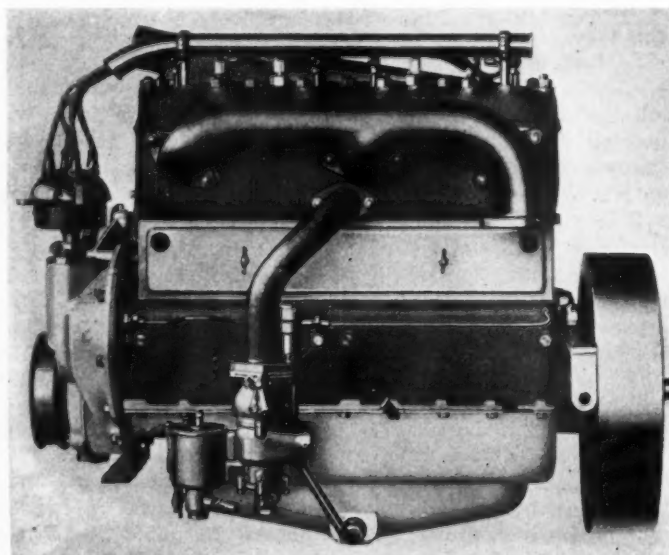
Unique Camshaft Arrangement

It has been pointed out once or twice that when the angle between the cylinders of a V-type engine is 90 deg. the sequence of valve operations is at 135 deg. so that one cam can operate two opposite valves if the camshaft is placed high enough to put the valves themselves at 135 deg. With a big motor this might be difficult because of the great amount of space it would make between the crankshaft and camshaft, but the idea has been worked into this motor very neatly. Having the valves at a larger angle than the cylinders also has the beneficial effect of inclining the pockets with reference to the cylinder bores and so cutting down their area. Of course this inclination of the valves so much further toward the horizontal makes tappet adjustment easier than ever.

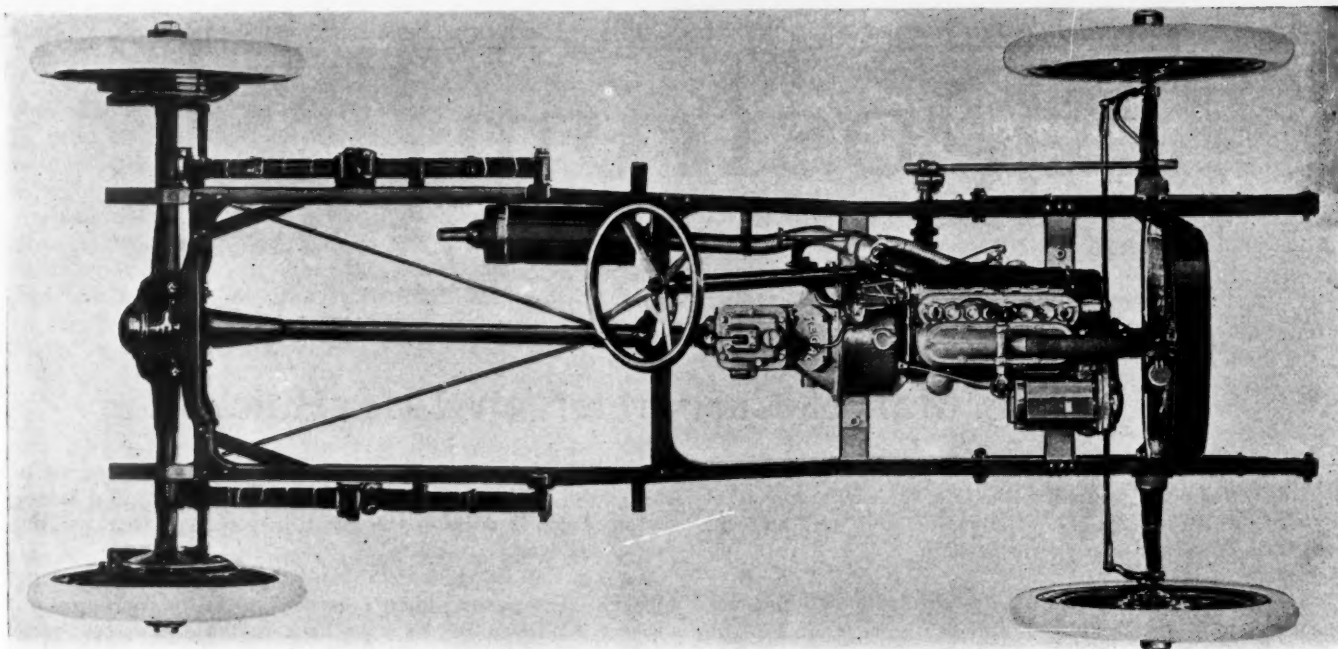
Helical spur gears are used for the camshaft drive on all models the materials being steel in cast iron.

Lubrication Systems Differ

For the light four the lubrication is splash, the level in the dip troughs being maintained by a plunger pump driven



Intake side of 1916 Regal four block motor



Plan for 1916 Regal four-cylinder chassis, showing compactness and simplicity of assembly

off the camshaft. On the big four the rear main bearing and the rear camshaft bearing have a force feed from the plunger pump, while the other two crankshaft and the camshaft bearings have pockets to catch splashed oil. Troughs and connecting-rod dippers are used in addition to insure ample and constant lubrication.

For the eight there are two separate plunger oil pumps located side by side on the front end of the motor these forcing to the main bearings on the crankshaft of which there are two. The crankshaft is drilled to the pin bearings and there are dip troughs also, as in the larger four. In both these pump leads see to the supply for the front end gears and the Dyneto chains.

Two Universals

Like the large four of 1915, the 1916 model and the eight have transmissions located on the rear axle and the driveshaft is inclosed in a torque tube. Unlike most constructions of this kind there are two universals, the torque tube being attached to the frame by a fork with two pivot bearings. There are no bearings between the driveshaft and its inclosing tube so the cutter acts simply as a protective covering and to take the twisting stress of the axle.

Small Four Has Unit Power Plant

For drive stresses two radius rods are arranged between the axle and the side rails of the frame so all possible stresses are cared for. The construction is as far from a Hotchkiss drive as it very well could be. The small car is different, having a unit power plant and a slightly different rear axle as can be seen in the chassis illustration. The axle is a floating pattern with ball bearings throughout.

All three have leather faced cone clutches, the two larger models being provided with cushion springs beneath the facing.

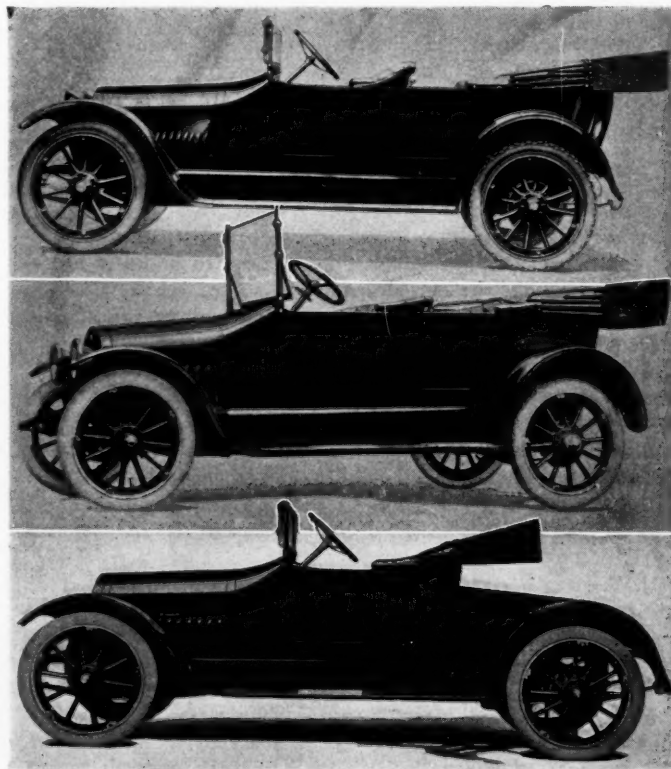
Low-Appearing Body Work

The big four and the eight have almost the same five-passenger body and the keynote of their style in low appearance. A fairly straight line side with an easy curve on the cowl running smoothly into the hood, domed fenders and absence of any sharp contrasts of curvature are characteristics. Internally there is plenty of leg room and a good depth of upholstery. The light four has a body on somewhat

the same lines but smaller, of course. Two details of the larger bodies which add greatly to the smart appearance are the all-aluminum toeboards in the driver's compartment and the use of black enamel running boards with heavy aluminum treads opposite the doors.

Tire equipment is as follows: Light four, 30 by 3½; Standard four, 33 by 4, and eight, 33 by 4, all on demountable rims with the spare rim carrier at the back of the body.

Mohair tops are used on all three cars, the two large ones having Jiffy curtains and all three are a single sort of one-person design.



Top—Regal eight touring car, which sells for \$1,200. Middle—Light four touring car listing at \$650. Bottom—Roadster body fitted to any of the three chassis

The Rostrum



Adjusting Marvel Carbureter on 1915 Buicks

EDITOR THE AUTOMOBILE:—Will you please send me directions for adjusting the Marvel carbureter used on the 1915 Buick six. The engine runs well, but will not throttle down and run slowly on high.

Wytotitlock, Me.

A. E. B.

—In general if a motor will not fire regularly at idling and low speeds, it is not securing a sufficiently rich mixture at this time. On the Marvel carbureter the primary gasoline adjustment which affects this is at the bottom and is in the form of a turn screw with a cross handle. It is directly under the center of the carbureter. This adjustment should be turned slowly to the right or left until the motor runs smoothly at idling speed. Since turning to the left allows more gasoline to pass through the needle valve, it would probably be necessary for you to turn it slightly in this direction to secure the proper adjustment.

If you desire to start from the beginning, and adjust the carbureter, the following directions will apply: Start by turning needle valve A, to the right until it is completely closed, an air adjustment B to the left until end of screw is even with end of ratchet set spring above it. Next open needle valve A one turn. Start the motor as usual, using choker button, if necessary. Allow the motor to warm up, then with spark retarded, turn adjustment A to the right until motor runs smoothly.

After the motor has warmed up, turn air valve adjusting

screw B to the left, a little at a time, until motor begins to slow down. This indicates that the air valve spring is too loose. Turn it back to the right just enough to make the motor run well.

To test the adjustment, advance spark and open throttle quickly. The motor should take hold instantly and speed up at once. If it misses or pops back in the carbureter, open needle valve A slightly by turning to the left. Do not move air adjustment screw B any more unless it appears absolutely necessary.

The best possible adjustment has been secured when air adjusting screw B is turned as far as possible to the left and needle valve A is turned as far as possible to the right, provided the motor runs smoothly and picks up quickly when the throttle is opened.

If the motor runs too fast with throttle closed, turn small set screw in throttle stop to the left. If motor stops when throttle is fully closed, turn the set screw to the right.

As the throttle opens, the hot air damper, which is connected to it by a link gradually closes, the greatest amount of hot air passing through the jackets when the throttle is nearly closed. The position of the hot air damper, at any time, is indicated by the slot at the end of the damper shaft. By loosening the set screw in the damper lever, this can be set for any desired relation between the damper and the throttle.

Motor Does Not Carbonize Quickly

Editor THE AUTOMOBILE:—How quickly will sufficient carbon collect in an automobile motor, so as to make it necessary to clean out the cylinders?

2—In the average life of a motor, how many times must carbon be burned out?

3—What is the average cost for burning carbon out of motors as per the following: four-cylinder, six, eight and twelve?

4—Are there any preparations on the market for mixing with the gasoline that will eliminate carbon without danger to the motor?

5—If possible, would like the names and prices of preparations in connection with question four.

N. Y.

F. M. L.

—In a new motor it should not be necessary to clean out the carbon more than once in 3000 miles. As the motor becomes older and the piston rings wear forming an oil seal which is less tight, more oil works its way into the combustion chamber with the result that carbonization is more frequent and cleaning will have to be resorted to more often. The estimate of 3000 miles is a very liberal one as there are many new cars which run 5000 and 6000 miles without carbon trouble sufficient to require the cylinders being scraped or burned out. As a general rule, it is a good thing to clean

out the carbon when the valves are ground. The two operations can be readily performed at the same time because with the valve caps removed, or with the cylinder head taken off as is done in some motors, the combustion chambers are accessible and can easily be scraped out.

2—As stated under question 1, this will depend entirely upon the condition of the motor. Some motors with leaky rings become so full of carbon after 300 or 400 miles that they start to pound and pre-ignite to such an extent that they cannot be sufficiently operated.

3—The average charge for burning out a four-cylinder motor is \$2, a six \$3, an eight at \$4 and a twelve \$6. This is based upon the charge generally made in garages of 50 cents per cylinder. The time required for this work is very short as with the use of the oxygen tanks it is only necessary to insert the lighted paper into the combustion chamber and then by use of the oxygen, combustion is immediately started and is quite rapid.

4—There are patented preparations on the market for mixing with gasoline which are stated not only to remove carbon but to increase the mileage. The danger of securing materials which will have a deleterious effect on the cylinder walls is so great that the nature of these preparations should be carefully scrutinized before they are used. A method of

removing carbon by kerosene which has been tried out with good results is to start the motor and then with the kerosene in a cup or some other small vessel, the quantity is poured into the air intake as the motor is running. While this is being done, the throttle is opened wider to prevent the motor from stalling as it will begin to splutter as soon as the kerosene begins to enter the manifold. The work should be done somewhere where it does not make much difference if the motor should smoke as the introduction of kerosene will cause large volumes of smoke to pour from the exhaust. It is also a good idea in doing this work to open the muffler cutout so as to prevent soot from filling the muffler.

5—This question is answered under the preceding.

Can Not Make a Solid Connection

Editor THE AUTOMOBILE:—In THE AUTOMOBILE for June 24, I have not secured exactly the information desired.

The meaning of my question in the Rostrum is,—would any harm result if I removed grease cups, and put metal bushings enough around the axle housing to keep it from moving while running the car.

I have investigated several cars and do not find any movable parts on the spring seats, and wondered if this could not be tightened on my Buick B model 36.

Angelica, Wis.

J. L. DeCock.

—The flexible connection here is necessary, as, were the connection solid, strains would be put on the springs and driving members which should not be encountered by them. This connection for the spring was designed to fit in with the other members of the rear system and therefore, should not be altered.

Transmission Losses Are Very Small

Editor THE AUTOMOBILE:—In trying to work out a proposition of hydraulic transmission of power, we are anxious to learn if possible what the percentage of loss is in the present gear driven and worm driven cars from the motor to the rear wheels?

Nashville, Tenn.

J. S. F.

—It has been estimated that in the car having an average amount of use, the loss from the motor to the rear wheels is approximately 5 per cent. The exact loss is determined by a number of factors, however, which vary. One of these is in the universal joints which have greater losses as the drive departs from that of a straight line. Some companies state that in worm drive the losses are 2 per cent larger on loads ranging from 8 to 45 hp.

Specifications of Buick, Ford and Franklin

Editor THE AUTOMOBILE:—Kindly answer the following: Can you give me the numbers of the patents which have been taken out on the Air-Friction Carburetor now made in Dayton, Ohio?

2—What is the bore, stroke, gear ratio and kind of axle in the Buick model 19, five-passenger car?

3—What is the bore and stroke, also the gear ratio of the Ford?

4—What is the bore, stroke and gear ratio of the Franklin?

5—What kind of valves are used in the Franklin engine?

6—What is it which makes the economy of the Franklin?

7—What is the boiling point in deg. Fahr. of gasoline?

8—What is the boiling point in deg. Fahr. in kerosene?

Barberton, Ohio.

O. H.

—THE AUTOMOBILE has no records of these patents.

2—Buick 19 model had a bore of $4\frac{1}{4}$ and a stroke of $4\frac{1}{2}$ in. The cylinders were cast in pairs. The car was equipped with a tubular radiator, both magneto and dry battery ignition, cone clutch, selective three-speed gearset, and had a

wheelbase of 105 in. with standard 56-in. tread. The tires were 32 by 4.

3—The Ford motor is $3\frac{1}{2}$ by 4. It is L-head block and geared 3.63 to 1. The wheelbase is 100 in.

4—The bore, stroke and gear ratio of the Franklin cars are as follows: $3\frac{1}{2}$ bore, 4-in. stroke and gear reduction 3.69 to 1 to 1.

5—The valves are overhead.

6—The principal economy feature in the Franklin car is the lightness due to the selection of materials, air cooling and other features of design. In explaining the effort to secure economy, the Franklin company states the following:

"To move an automobile which has a tendency to remain stationary by virtue of its own weight, energy must be employed. The drag exerted by the contact of the wheels with the ground and the friction of the moving parts must be overcome by energy, and the source of energy itself must secure the greatest proportion of power which is in the fuel. To secure the most power from gasoline, little or no heat developed by the combustion of the fuel that can be changed into work should be lost; and due to direct cooling on these cars, a small percentage is thrown away. The efficient temperature of operation of a Franklin motor is 350 deg. Fahr."

7—The boiling point of gasoline varies with the gravity and hence it is impossible to give a boiling point which will cover many different grades of fuel. One hundred and fifty deg. Fahr. has been frequently given as the boiling point of common gasoline. Benzine it is stated has a boiling point of 176 deg. and kerosene of the highest grade, 185 or 190. These quantities are only estimates, however, and cannot be taken as mathematically accurate for any definite grade of gasoline.

Tangent of Tank Angle the Factor

Editor THE AUTOMOBILE:—We have a Thomas-Detroit which we are changing into a raceabout, having dropped the seat and placed the tank on the top of the chassis, and we would like to know if you could advise the amount of drop from the bottom of the tank to the carburetor which would be necessary in order to get a free flow of gas on all hills.

The tank was originally underslung with a forcefeed, but for some reason this was disconnected—probably because it did not work, although I have heard that the pump on this car was eminently satisfactory, and I want to know whether or not it will be necessary to rerig this up in order to take care of a steady flow of gas at all times and on all hills.

Williamsport, Pa.

H. W.

—The distance of the bottom of the tank above the car-

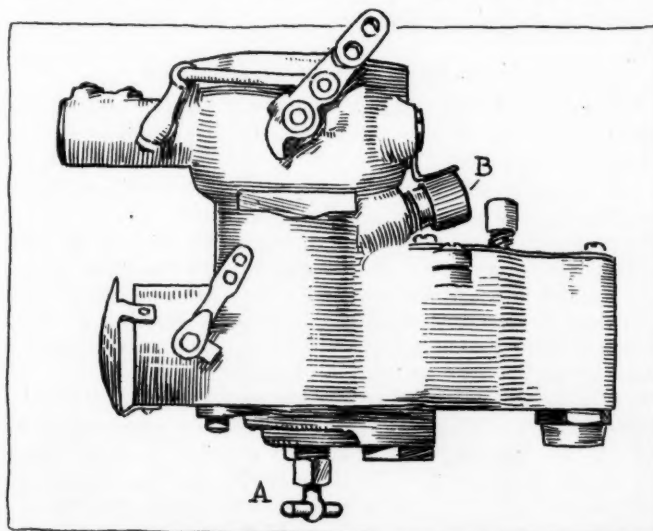


Fig. 1—Adjustments are made on the Marvel carburetor used in the Buick six at the points A and B

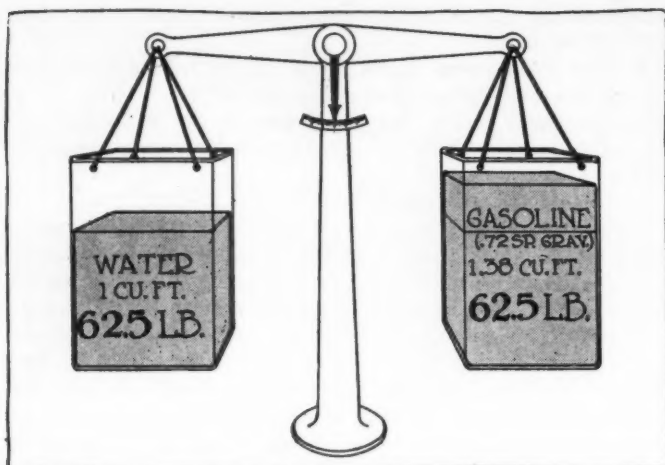


Fig. 2—A volume of gasoline must be 1.38 times as large as a volume of water to weigh the same amount if the specific gravity of the gasoline is 0.72

bureter is not the only factor which controls the flow of gasoline. Strange as it may seem at first, the distance of the tank behind the carburetor has just as much influence on the angle of the grade that the car may climb as the height has. To express the proposition definitely, the angle at which the car can climb, for any given tank location, depends upon the height of the tank above the carburetor vertically divided by the distance of the tank back of the carburetor horizontally. If, for instance, a tank is 12 in. above the carburetor and 2 ft. back of it, the determining factor would be 12 divided by 24 or 0.5. If the tank on the other hand were 3 ft. back of the carburetor, the determining factor would be 12 divided by 36 or 0.333. As will be noted this factor becomes less and less as the tank is further back of the carburetor. This fact becomes more evident still, if you will consider a tank which is a foot above the carburetor directly above that instrument and compare it with a tank which is a foot above the carburetor, but mounted in the rear of the car. It is evident that a better flow will be had from the tank directly above the carburetor on a slope of any steepness.

To bring the matter down to actual figures, if the height above the carburetor divided by the distance back of the carburetor measured vertically and horizontally respectively equals 0.176, the car will be able to climb anything up to a 10 per cent grade. If that figure equals 0.268 it will be able to climb anything up to 15 deg. If the figure is 0.364 the gradient will have to be 20 deg. before flow ceases and if the figure is 0.578 the flow would not cease under 30 deg.

Weight of a Gallon of Gasoline

Editor THE AUTOMOBILE:—Would you kindly inform me how much a gallon of gasoline weighs, the gravity being 0.72? San Francisco, Cal. J. R.

—If, when speaking of gravity, you refer to the specific gravity scale the weight of a gallon of gasoline of 0.72 specific gravity would be 6.001632 lb., taking water at the specific gravity 1 to weigh 8.3356 lb. per gallon. On the other hand, if you mean 0.72 gravity on the Baumé scale, this would be equivalent to about 0.69 specific gravity. Gasoline of 0.69 specific gravity weighs 5.751564 lb. assuming that a gallon of water of specific gravity 1 weighs 8.3356 lb.

It is generally taken that a cubic foot of water distilled, weighs 62.5 lb. although the actual weight is somewhat below this. If the gasoline is 0.72 specific gravity, it would take 1.38 cu. ft. to weigh 62½ lb. In other words, the volume of gasoline to weigh the same amount as a given volume of water must be 1.38 times as large if the specific gravity is 0.72. This is graphically brought out in Fig. 2.

Gasoline of 63 Baumé is in common usage and for calcula-

tion in regard to the weight for any definite quantity of gasoline of this gravity, a handy chart is given in Fig. 3. Referring to this, it will be seen that the weight is very close to 6 lb. to the gallon and in making any approximate determinations of the weight of the various tanks filled with gasoline, 6 lb. to the gallon can be taken as sufficiently accurate.

If you desire to determine the weight of gasoline for any specific gravity, referring to gallon, it is only necessary to multiply the figure 8.3356 by that specific gravity. This figure is the weight of water since the specific gravity of water is 1, multiplying by the specific gravity of the liquid of which you wish to find the weight will give you the desired results. In case you only have the specific gravity in terms of the Baumé scale, it will be necessary to secure the specific gravity from a conversion table. The Baumé scale is so arranged that 10 Baumé corresponds to 1 specific gravity. In other words, water would be 10 on the specific gravity and 10 on the Baumé scale. Ninety on the Baumé scale is 0.6363 specific gravity. If you desire to secure the specific gravity from the Baumé scale, and have not a conversion table at hand, it can be found readily by the formula:

$$\text{Specific Gravity} = \frac{140}{130 + \text{Be}}$$

For example, if your hydrometer showed the gasoline to be 64 Baumé, and you desired to find the specific gravity by means of the above formula, you would divide 140 by 130 plus 64 or 140 by 194. The result of this division is 0.7216, which is the specific gravity of a liquid 64 on the Baumé scale. To find the weight of a gallon of a liquid of this gravity you would multiply 8.3356 by 0.7216, which would give you 6.03+ lb.

Horsepower of Two Cylinder 5 by 6½

Editor THE AUTOMOBILE:—What is the horsepower of a two-cylinder motor with 5-in. bore and 6½-in. stroke at 750 r.p.m.?

2—What type of radiator gives the best results on a 16-hp. gasoline tractor and what capacity should it have?

Fingal, N. D.

A. T.

—It is impossible to give the exact brake horsepower of a motor by making calculations from formulas based upon bore, stroke and r.p.m. The reason for this is that the manifold design, valve size and general structure of the motor, has so much to do with the matter that the power must be

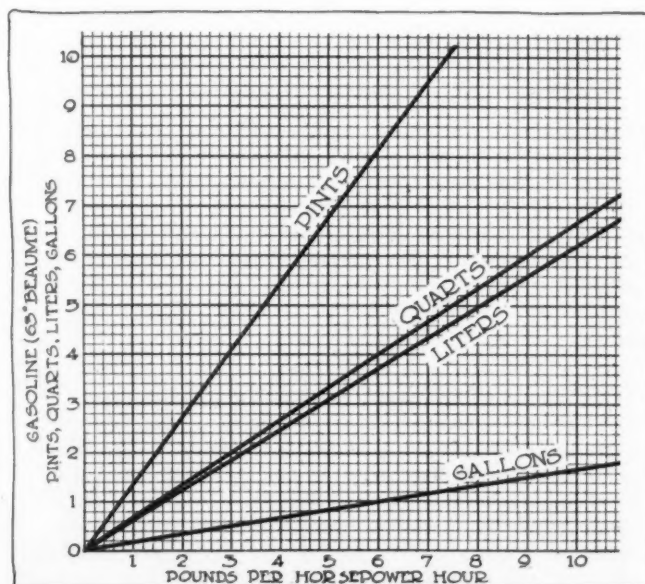


Fig. 3—Chart showing the weight of 63 Baumé gasoline in pounds per horsepower hour

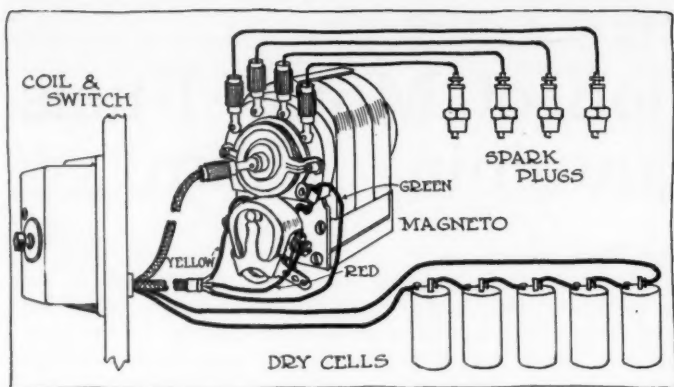


Fig. 4—Diagram of wiring used on model 10 Buick showing terminal connections

measured on a block to get anything like accurate results. An approximation can be made however, by formula, assuming that the motor is in fairly good condition and that the design is approximately correct. On the basis of this formula, your motor would develop about 20 hp.

2—It would be most economical for you to purchase a vertical tube radiator as these are cheaper than the cellular and more rugged. A radiator of about the size of that used in the Ford should be sufficient, and it will be perhaps quite easy for you to pick up a Ford radiator either new or second-hand.

Of course, in tractor work you have not the advantage of the speed of the car which you have in ordinary automobile practice. When running along a road at 25 m.p.h. the current of air striking a radiator has such a large cooling effect that a radiator of smaller size can be used and would be necessary if the car were running in such a manner that it did not get the benefit of this blast of air. It may be well possible therefore, that with a motor which is not designed to secure the best cooling efficiency, that a radiator of this size will be too small, although it would seem that ordinarily it would suffice. The question of radiator size is not one which can be determined by formula but is more in the nature of experimental work. Where a radiator of definite size has been tried out on a given motor with good results, it is natural to suppose that on other motors of the same size the same radiating capacity will do the work properly, and it is on this basis that most radiators are determined.

Piston Rings for Whiting Roadster

Editor THE AUTOMOBILE:—What are the piston ring dimensions of the model A, Whiting roadster, which was made by the Flint Wagon Works Co. of Flint, Mich.?

2—Would a worn cam and breaker arm on Remy magneto cause missing and hitting? Is it O. K. while running slowly?

3—Is model D Schebler carbureter suitable for this motor? Fort Wayne, Ind. J. E. D.

—The piston ring dimensions on the Whiting roadster are 3¼ in. in diameter and 0.187 in. in thickness.

2—The worn cam and breaker arm would cause the trouble you refer to.

3—Model D Schebler can be fitted to this car, the proper size to use being 1 in.

Missing Due to Loose Terminals

Editor THE AUTOMOBILE:—Please give me a wiring diagram of the Model 10 Buick, and give causes and remedy for magneto missing or back firing at low speeds. The car runs excellently on dry cells, but very poorly on the magneto at low speed.

Meadville, Pa.

I. H. A.

—A diagram of the model 10 wiring is shown in the accompanying illustration, Fig. 4. Missing is due, of course, to loose terminals and connections, dirty or burned contact

points in the circuit breaker, or poor contact of the distributor brush with its terminals. The Buick company advises that the user should keep the magneto clean.

Back firing is not due to magneto trouble unless the spark is very badly out of time. It is generally due to running with too rich or too lean a mixture from the carbureter.

Wiring of Battery Lighting System

Editor THE AUTOMOBILE:—Kindly give me the best diagram for wiring electric lights on an automobile using a storage battery only but including a meter for two headlights, two side lights, one tail and one dash light with three separate switches.

Newark, N. J.

L. S. H.

—The accompanying diagram, Fig. 5, shows the method for wiring electric lights from a storage battery. From your inquiry it is not clear whether you wish to operate all the lamps independent of one another, or to run them in sets as is customary. That is, it is generally the practice to have the two headlights in parallel on one switch with the side and tail lights on another. A third point on the switch turns on both sets, with the dash light independent, so that it can be turned on or off as desired. This gives you independent switching arrangement without the complication of an independent switch for each arrangement of lights. It is hardly possible that you will desire to burn one headlight at a time but since you are using the storage battery it might be that you will desire to economize in this direction and probably the best arrangement in that case would be to simply have an independent switch to break the circuit to one of the head lamps during the time that you desire to operate on but one.

Another means of effecting economy in the current consumption is to have the side lamps off when the headlights are on. You will rarely if ever require both, because the side lamps are merely for the purpose of running signal lights with the illumination feature secondary. The tail light you will need continuously while running or while the car is standing at night.

To sum up, the conditions which you will probably require with the battery as the only source of current are as follows: 1—Side and tail lights lit for car standing, or running through cities where headlights are barred. 2—Head and tail lights lit for country work; 3—One head and tail light lit for running through country with good roads. The accompanying wiring diagram gives the method for accomplishing these conditions and at the same time provides an ammeter to measure the current consumption under any condition. The dash lamp is so placed that it can be turned on occasionally to see the dash instruments and to test the tail light with which it is in series.

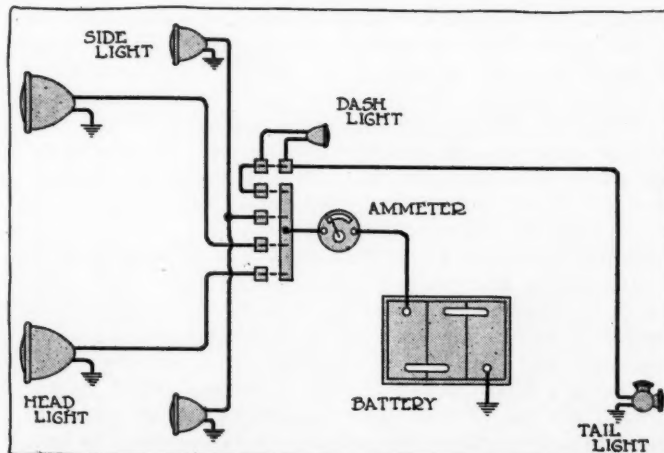


Fig. 5—Method of wiring a car for using electric lights in connection with a storage battery

Analysis and Valuation of Motor Fuels

14 Methods for Examining Them

From German Data

WHILE the number and diversity of motor fuels made, sold and used for automobile and boat purposes in Germany are much greater than in the United States, the results of the work done for a series of years by Dr. Karl Dieterich in examining all these fuels, with a view to determining their relative utility and value and enabling the public to distinguish among them, will also here be found of interest and valuable for reference, so much more as Dr. Dieterich adds to his competence as a chemist, being a director of the Helfenberg Chemical Works Corporation, that of an enthusiastic automobilist who has owned and driven nearly thirty different cars. He has lately advocated the plan of buying a new car or two every year on the ground that the pleasure is increased, the worries reduced and that the expense of it can be very moderate if the cars are treated right and the opportunities for trading the used cars at a good price are quietly watched with the aid of organized professional salesmanship. But, it may be said, other contributors to the German automobile press vigorously deny that this "American plan" can be made economical for persons in ordinary circumstances, though it may be possible to make it less extravagant than it generally is.

Dr. Dieterich reports his work in *Automobil-Rundschau* for May, where it occupies the whole issue, comprising thirty text pages, and the report is also published as a separate print by the *Mitteleuropaisches Motorwagen Verein* (Central European Automobile Association). An extract is presented in the following, giving the reasoning, statements and chemical information of widest technical and trade interest.

(The German term *Benzin* is throughout rendered as "gasoline," but the word *Gasolin* or *Gasoline* is used in Germany as a trade name for certain grades.)

Many Varieties—Insufficiently Labeled

The fuel for internal combustion motors was formerly only one substance called gasoline whose chemical and physical properties varied but little, but nowadays a large number of fluids are in the market, some of which appear under fantastic names and with claims of incredible fuel virtues. In most cases there is only question of mixtures of gasoline and benzol, of benzol and alcohol, occasionally with additions of kerosene, and they all, of course, have certain advantages, but on the whole they are never superior to the good unmixed gasolines for ordinary automobile motors. The admixture of nitrogen compounds is on account of the great increase of the explosive violence and the danger of backfiring not to be undertaken except with the greatest caution. During the examinations extending over a number of years, nitro-admixtures have been encountered very rarely but camphor and naphthalene with some frequency.

We have advanced so far with modern carbureters that we do not depend absolutely on gasoline but can make use of almost any fuel whose properties we know, if we acquire the experience and insight enabling us to adapt ourselves to the circumstances. The skilful motorist can drive with benzol and alcohol, and if the motor is sometimes found injured through the use of such fuels this result can generally be traced to unsuspected adulterations. It is necessary to have the mixtures so nearly pure and definite in their properties that nothing impossible is asked of the carbureter. Not only

a chemical examination of motor fuels is therefore needed but certain criteria should be established for recognizing the properties of every fuel in the market. Under the present circumstances the automobilist or employer of motor power cannot be expected to find his way among the many grades and mixtures that are offered him, and the chemist who undertakes to analyze them looks in vain for systematic guidance in the technical literature. [The author gives a list of all important German books and articles dealing with the fuels and a digest of the contents of each of them.]

Many believe that after the war is over and gasoline again becomes available German automobilists will refuse to return to this fuel, having learned to get along without it, but it is to be remembered that there is a superior convenience in the use of gasoline. The motor can be started easily, even in winter, with the gasoline, and it can be obtained everywhere, while with benzol and especially with alcohol mixtures a marked drop in the temperature necessitates some re-arrangement of the carbureter with adjustment of the pre-heating and of jets. The chauffeur usually prefers the less exacting gasoline and influences his employer in this direction. A quite general return to the gasoline is therefore to be expected after the war, habits and convenience being strong factors, though it is to be hoped that benzol will become a stronger and stronger competitor. Meanwhile the enormous demand for motor fuels and the resulting price fluctuations have changed the market conditions radically. While formerly the standard article was a fairly pure gasoline with the boiling points close together and scarcely any components that did not evaporate at 100 deg. C. and was sold for less than 30 Pfennig (7½ cents) per kilogram, the fluid obtainable at this price now is a gasoline of medium specific gravity, impure, containing benzol, with boiling points far apart and with 20 to 30 per cent of components which do not evaporate below 100 deg. C. At the same time the carbureters have been adapted to the lower grades of fuel. In some of them, which are intended to work with impure medium and heavy gasoline, with benzols and even with alcohol, no other changes are needed for going from a volatile to a heavier fuel than adjustments of air intakes and jets, increased pre-heating and raising of the float level. In other carbureters even these changes can be dispensed with if maximum fuel economy is not demanded. At a pinch the modern carbureter thus consumes anything, even if it cannot digest it.

Specific Gravity No Criterion

Commerce in gasoline and benzol has so far been based on confidence, as they have been sold almost exclusively on a basis of specific gravity, although it is possible to produce any specific gravity of the middle range by suitable mixing of higher and lower fractions of the distillation. The result is usually one of the mixtures, before referred to, in which boiling points are far apart and a large percentage of the components does not vaporize till above 100 deg. C. This development has now made the testing of the motor fuels a necessity; also a separation between gasolines which are adapted for motors and those which are not. It has become desirable to establish physico-chemical specifications for the fuels and to discontinue the practice of grading them by their specific gravity alone.

Comparison of Gasoline and Benzol for Motors

| Origin | GASOLINE | BENZOL |
|--|--|---|
| | Distilled from Petroleum | Distilled from Coal |
| Production and refining..... | By repeated fractional distillation, supplemented, if necessary, by washing with acids and alkalis. | Mostly from the gases of coke furnaces; also from light coal tar oil. Refined by repeated distillation and leaching with acids, lye and water. Can be made synthetically from benzoic acid or acetylene. |
| Chemical composition..... | Unstable mixture of hydrocarbons of the paraffine group: butane C_4H_{10} , pentane C_5H_{12} , hexane C_6H_{14} , heptane C_7H_{16} , octane C_8H_{18} . Principal component is hexane. Boiling point, 69 deg. C. | Almost constant mixture of aromatic hydrocarbons. Pure benzol has 95% C_6H_6 ; commercial automobile 90% benzol consists of 84% benzol, 13% toluol, 3% xylol and traces of thiophene. It is called "90%" because 90% should evaporate up to 100 deg. C. |
| Chemical formula and specification. | In the main C_6H_{14} ; further C_4H_{10} , C_5H_{12} , C_7H_{16} , C_8H_{18} . A paraffine hydrocarbon with open C-chain, indifferent to acids and alkalis. | In the main C_6H_6 ; in addition C_6H_5 (CH_3), C_6H_4 (CH_3) ₂ and C_6H_4S . Aromatic hydrocarbon with closed C-chain. Nitric acid and sulphuric acid, mixed, changes benzol to nitrobenzol. |
| Carbon and hydrogen contents... | About 85% C and 15% H. | About 92% C and 8% H. |
| Specific gravity..... | From .680 (light) to .750 and higher (heavy), at 15 deg. C. | Pure benzol .8730 to .8770 at 15 deg. C. Automobile benzol about .880 at 15 deg. C. |
| Boiling points..... | Hexane 69 deg. C. (pentane 36 deg. C., heptane 98.4 deg. C., octane 125.5 deg. C.). Light gasoline (from .650 to .700 s.g.) between 40 and 100 deg. C.; medium from .700 to .730 s.g.) between 45 and 140 deg. C. | Pure 80 to 81 deg. C. Automobile about 80 to 120 deg. C. Toluol, 111 deg. C. Xylol, 138 to 141.9 deg. C. |
| Heat units (calories)..... | 9,500 to 10,500. | 9,350 to 10,000. |
| Freezing point..... | Below 15 deg. C. minus. | Pure at 0 deg. C.; automobile benzol at 5 deg. C. minus. Mixture of $\frac{3}{4}$ benzol and $\frac{1}{4}$ gasoline at about 10 deg. C. minus. Auto-benzol is doctored with additional toluol for winter use to lower the freezing point. |
| Velocity of flame propagation in explosive mixture. | 2.5 meters per second (oxyhydric gas 100 times as fast). | Smaller than for gasoline. |
| Air required for combustion..... | For 1 kilogram 11.7 cubic meters of air, the latter composed of $\frac{1}{5}$ nitrogen and $\frac{4}{5}$ oxygen. | For 1 kilogram 10.2 cubic meters of air. In practice 20% more air is used. |
| Combustion formula..... | $C_6H_{14} + 19O = 6CO_2 + 7H_2O$; or hexane + oxygen = carbon dioxide + water. | $C_6H_6 + 15O = 6CO_2 + 3H_2O$; or benzol + oxygen = carbon dioxide + water. |
| Fuel efficiency..... | With economical motor 20 to 23%. Rest goes into heat and intermediate combustion products, as only a smaller portion is completely oxidized. | Similar to gasoline. Benzol is less sensitive to correctness of air mixture than gasoline. |
| Effective horsepower from 35 hp. Bussing motor, by official tests. | At 1500 r.p.m.: medium gasoline, 54 hp.; heavy gasoline, 53.6 hp. | Only 49.4 hp.; 8% less than with gasoline. |
| Weight capacity of fuel tank for 100 liters. | 70 kilograms. | 86.5 kilograms; giving greater mileage from one filling of tank than gasoline. |
| Vaporization..... | Easier with gasoline. Most modern carbureters can work with either gasoline or benzol. | More difficult; requires therefor in practice more air as well as more heat. |
| Odor and exhaust..... | Almost odorless. Exhaust acid and irritating to mucous membranes. | Aromatic. Exhaust also aromatic; at all events pleasanter odor than from gasoline. |
| Toxicity..... | Gases poisonous; caution needed. | Unrefined more poisonous, auto-benzol not more poisonous; caution needed. |
| Fire risk..... | Considerable. | Less risk as less volatile. |
| Corrodes machine parts?..... | No. | No. If it does, the carbureter is not properly adjusted. Sooting and oily deposits are symptoms of irrational carburization or unsuitable carbureter. |
| Price per kilogram (in Germany, 1915). | Light grades more than 50 pfennig; heavy grades cheaper. | Formerly 30 pfennig; now higher. |
| Sources of supply..... | America, East India, Japan and Sunda Islands (Sumatra, etc.) produce 40 million tons of petroleum annually. Russia, Galicia, Roumania and Germany less than 13 millions. Dealers everywhere. | Germany produces now 120,000 to 150,000 tons, covering home demand. Sales stations organized, and more to be established. |

Chemical analysis alone has, on the other hand, become more or less inadequate and unsafe through the specialization of the fuel preparations, as the methods of analysis prescribed in the technical literature take little or no heed of the demands which should be made in each class of the gasolines and of the other fuels. [There is a clash here in the nomenclature, as the Germans speak of light, medium and heavy *Benzin*, making three classes, while no similar classification of gasolines is recognized in the United States.] Such analysis now requires to be specialized with a view to bringing out

the fitness or unfitness of each preparation for its intended purpose, and here the guidance of long and first-hand practical experience with the operation of motors is needed in order to throw the light of practice over the chemical examinations. This means, further, the general adoption of a special apparatus and process, devised under the guidance of all the required special knowledge and motor skill and suitable for being used and applied by ordinary chemists or even by motorists who are laymen in this branch of science. [One of the author's objects is admittedly to present the merits of

his own testing apparatus and of the preparation, called "Dracorubin" paper, which is the practical upshot of his protracted investigations in this field, while also giving exhaustively the technical and practical reasons for the preference accorded them among all appliances for tests of motor fuels.]

The accompanying table giving a comparison of gasoline and benzol in their main physical and chemical features is useful for reference and serves as an introduction to other tables giving complete physico-chemical examination of 92 gasoline, benzol and alcohol products, most of which are intended as fuels for motors, from automobile and aviation motors to Diesel motors, while a few are intended for industrial purposes and illustrate the subject by contrast.

Fourteen Methods of Examination

The methods by which each of these products has been examined and classified comprise: (1) determination of the specific gravity, (2) noting of colors and other exterior characteristics, (3) test of odor on filter paper, (4) noting time required for complete evaporation of given quantity, etc., (5) behavior with litmus, (6) coloration with sulphuric acid, (7) qualitative and quantitative tracing of aromatic hydrocarbons and unsaturated combinations, (8) test for benzol with isatine ($C_6H_5NO_2$) sulphuric acid, (9) test for benzol by nitration with nitric and sulphuric acids, (10) test with "Dracorubin," (11) test with nitrate of silver, (12) test for water with calcium carbide, (13) fractional distillation and (14) determination of refractometer degree.

[Dr. Dieterich now gives an account of the process with each of these methods and of the observations made in connection with each of them, finally coming to his conclusions with regard to the best classification of motor fuels, the demands which should be made in each class and the safeguards which should be established in commerce to enable purchasers to know what they are buying and how that which they buy may be utilized to best advantage. Reversing this order, his conclusions are here given first, while the tables of examination data for each of the ninety-two products are omitted. The descriptive account of the examination methods follows in part and will be finished in another instalment.]

Regulation of Motor Fuel Commerce

Above all it is asked that every gasoline shall be sold under one of three classes: Class A, light motor gasolines (*Motoren Leichtbenzine*), class B, medium motor gasolines (*Motoren Mittelbenzine*) and class C, heavy motor gasolines (*Motoren Schwerbenzine* or *Nutzbenzine*). These terms should correspond to definite characteristics, so that the class name alone will tell the motorist approximately the quality of the brand.

Steps in this direction have been taken by different automobile associations, by the commissary department of the army and by municipal bodies, in so far as they purchase gasoline according to specifications, relating especially to the boiling point limits, and the proposition is therefore not altogether new.

The details of the demands to be made are worked out in the following schedules, in which all the required classifications of benzols and alcohol mixtures are also indicated, and which refer to the results which should be obtained by the above-mentioned different test methods.

I. Motor Gasolines

Class A: Light Motor Gasolines

Specific Gravity: 0.650 to 0.700

Primary Properties—colorless, leaving no odor after evaporation, perfectly free from dirt, leaving no grease spot.

Time for Evaporation (of given quantity under given conditions)—less than two hours.

Reaction with Sulphuric Acid—almost colorless, at most a faintly yellow coloration of the acid.

Nitration Test—as nearly free from benzol as possible, at most a faint odor of nitrobenzol.

"Dracorubin" Test—the gasoline colorless, at most a faint rose pink sheen, traces of benzol, at no events more than 5 per cent.

Nitrate of Silver Test—perfectly negative.

Carbide Test for Water—perfectly negative.

Litmus Test—perfectly neutral.

Boiling Points—as close together as possible, lower limit 40 deg. C., upper limit 125 deg. C.

Components Above 100 Deg. C—preferably none, at most 10 per cent.

Refractometer Degree—not under 54. [Explained in the next instalment.]

Price: highest of any motor gasolines, at present fluctuating (in Germany) between 46 and 55 pfennig per kilogram.

Class B: Medium Motor Gasolines

Specific Gravity: 0.701 to 0.730

Primary Properties—colorless, no odor after evaporation, perfectly free from dirt, leaving no grease spot.

Time for Evaporation—not over 2½ hours.

Reaction with Sulphuric Acid—at most faint yellow coloration of the acid.

Nitration Test—almost free from benzol, small amounts of nitrobenzol admissible.

"Dracorubin" Test—gasoline nearly colorless, at most faint rose pink coloration; small natural benzol content, at most 20 per cent admissible.

Nitrate of Silver Test—at most a faint coloration.

Carbide Test for Water—perfectly negative.

Litmus Test—perfectly neutral.

Boiling Points—lower limit 45 deg. C., upper limit 140 deg. C.

Components Above 100 Deg. C—at most 30 per cent.

Refractometer Degree—not under 53.

Price—lower than Class A; at present between 35 and 45 pfennig per kilogram.

Class C: Heavy Motor Gasolines

Specific Gravity: 0.731 to 0.750 and higher

Primary Properties—as colorless as possible, leaving as little odor and grease after evaporation as possible; yellowish coloration, some odor and residue admissible.

Time for Evaporation—preferably not more than three to four hours.

Reaction with Sulphuric Acid—from yellow to light brown coloration of the acid admissible.

Nitration Test—certain amounts of nitrobenzol or nitro-toluol admissible, showing a natural content (not an admixture) of aromatic hydrocarbons.

"Dracorubin" Test—gasoline rose pink to light red or yellow-brownish coloration; not over 25 per cent of aromatic hydrocarbons (benzol, toluol, etc.) admissible.

Nitrate of Silver Test—faint blacking admissible.

Carbide Test for Water—perfectly negative.

Litmus Test—perfectly neutral.

Boiling Points—lower limit 65 deg. C., upper limit 150 to 170 deg. C.

Components Above 100 Deg. C—as many below as possible, not more than 75 to 80 per cent above.

Refractometer Degree—not under 50.

Price—lowest of all motor gasolines, at present usually below 30 to 35 pfennig per kilogram.

II. Motor Benzols

Specific Gravity: 0.880 to 0.885

Primary Properties—as colorless as possible, at most faintly yellowish, leaving no odor after evaporation, no residue.

Time for Evaporation—preferably not over 3½ hours.

Reaction with Sulphuric Acid—weak yellow coloration of the acid admissible.

"Dracorubin" Test—dark blood red color = 90 per cent benzol, the test paper after drying tile red, finely mottled.

Nitrate of Silver Test—blackened.

Carbide Test for Water—perfectly negative.

Litmus Test—perfectly neutral.

Boiling Points—lower limit 80 deg. C., upper limit 120 deg. C.

Components Vaporizing Below 100 Deg. C.—at least 90 per cent, the rest passing before 120 deg. C. is reached.

Refractometer Degree—37 to 38.

Price—at present 32 to 37 pfennig per kilogram.

III. Motor Alcohols

Specific Gravity: 0.822 to 0.825

Primary Properties—almost colorless, faintly yellow, odor according to denaturing agent (pyridine).

Time for Evaporation—at most 4½ to 5 hours.

"Dracorubin" Test—dark blood red color = 95 per cent alcohol, test paper after drying not mottled, bright rose pink.

Boiling Points—lower limit below 70 deg. C., upper limit 85 deg. C.

Components Vaporizing Below 100 Deg. C.—100 per cent.

Carbide Test for Water—only small air bubbles and traces of acetylene.

Refractometer Degree—58 to 59.

Price—at present about 35 pfennig per kilogram.

In drawing these requirements for the five classes of motor fuels, it has been considered that carbureters are being improved all the time and that therefore the demands should be formulated a little milder than the actual conditions of the moment would justify.

The brief references to the different testing methods which are not sufficiently explained in the schedules are made clear in the detailed account of each method, the first part of which follows herewith.

1. To Determine the Specific Gravity

Specific gravity is determined either with Mohr's scales or by aerometer at 15 deg. C. For the gasolines a corrective test is advisable, and that devised by Mendelejef has been used. It is described in HOLDE'S *Untersuchung der Kohlenwasserstoffe, Oele und Fette*, 4th edition, page 55.

The medium gasolines now most used, which are those ranging only from .715 to .730, show such wide differences in composition and value that for this reason alone the customary classification by specific gravity without mention of other test results becomes worthless. This classification must therefore be used merely as a convenient basis giving the rough division lines, and within each class each fuel must be judged individually by other indications and with its purpose and price in mind.

The proposed classification by specific gravity is given in the foregoing schedules. Mixtures of gasoline and benzol or of benzol and alcohol have their specific gravity determined by the proportions of their components.

2. Color and Other External Characteristics

After shaking the fluid one pours some of it into a high vessel of clear glass and observes it, using a sheet of white paper as background. In the case of gasolines, if they are colorless, it is not possible to tell what class they belong to. Only the very heavy gasolines and impure benzols and alcohols show a yellowish tint. And it must of course be demanded of all the fuels that they shall be clear; that is, that they shall not contain particles of dirt.

3. Test for Odor on Filter Paper

A little of the fluid is poured out on filter paper and is evaporated. The characteristic odors of gasoline and of

benzol can be recognized. The easier and more rapidly a gasoline or benzol evaporates, without leaving any odor or grease spot on the filter paper, the better it is. The odor disappears slowly after a mixed or highly composite gasoline. Impurities remain altogether, and poor gasolines of class B leave a permanent odor and sometimes, as also in the case of most of the gasolines of class C, a greasy residue. Denatured alcohol leaves a white residue smelling of wood alcohol and pyridine. Fluid containing water leaves beads or drops of water.

4. Timing of Evaporation in Clock Crystal

An evaporation pan shaped as the crystal of a clock (the edges rising at a right angle, not flaringly as a saucer), 10 centimeters (4 in.) in diameter and 1 centimeter deep, is placed on a piece of black paper, for easier observation, in a place that is free from drafts and where the temperature can be maintained between 15 and 20 deg. C., and is filled with 10 cubic centimeters of the fluid to be examined. The observation relates to the time required for complete evaporation, to the uniformity—whether it evaporates more rapidly at first and later more slowly—and to the residuum, which may be odorous, oily, white or of other nature.

This test is not commonly employed and has the disadvantage that it is not always easy to maintain an equable temperature without drafts in a room, but this difficulty corresponds somewhat to the working conditions of a carbureter, and the test gives a practical picture of fuel quality which is not so readily obtained by other means by laymen. The average time limits which must be required of the different classes of fuels is given in the schedules.

An observation in connection with this test is that mixtures of light and heavy gasolines as well as poor gasolines in general show a tendency to the formation of drops, but no safe inferences can perhaps be drawn from this peculiarity.

A guide to the proportions in which admixtures affect the time of evaporation of gasolines is given in the following list, in which it will be noticed that the time for pure gasoline is only 57 min., while the schedule of requirements for light gasolines of class A allows "less than 2 hr."

TIME FOR EVAPORATION OF 10 CUBIC CENTIMETERS OF FUEL IN VESSEL OF 10 CENTIMETER DIAMETER AND 1 CENTIMETER DEEP

| | |
|--|-------------|
| Pure gasoline | 57 min. |
| " " + 5% benzol | 1 hr. |
| " " + 10% " | 1 " 7 " |
| " " + 20% " | 1 " 26 " |
| " " + 25% " | 1 " 46 " |
| " " + 30% " | 1 " 51 " |
| " " + 40% " | 1 " 54 " |
| " " + 50% " | 1 " 56 " |
| " " + 60% " | 1 " 58 " |
| " " + 70% " | 1 " 59 " |
| " " + 80% " | 2 " 3 " |
| " " + 90% " | 2 " 19 " |
| Ether | 38 " |
| Benzol 100% | 2 " 23 " |
| Toluol | 9 " 15 " |
| Xylol—after 3 days not yet evaporated. | |
| Motor alcohol 95% | 4½ to 5 hr. |

As the time and the uniform progress of the evaporation, from beginning to end, means a great deal for indicating whether the fuel is liable to clog a carbureter nozzle and for the functioning and responsiveness of the carbureter in general, and the test shows marked differences in the evaporation time of the gasolines in class C, and less pronounced but still important ones in classes A and B, its practical utility may be considered established.

It shows a number of interesting peculiarities in the retarding and disproportionate effects of heavy components.

(To be continued)

ACCESSORIES

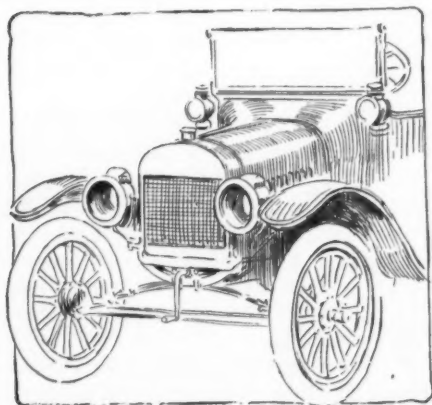
Midgley Non-Skid Tire

THE Midgley tire secures its non-skid quality by steel wires embedded in the tread. These wires are in the shape of spiral springs made of steel piano wire. As shown by the section herewith, there are four of these spirals, each long enough to completely encircle the wheel. They are vulcanized into the rubber, with their outer surfaces just at the surface of the tread. After running a few miles the wear against the road cuts the exposed edge of the wire, cutting the spring in such a way that the wire is no longer in a spiral, but consists of a great number of wire loops shaped like horseshoes, with the ends appearing just even with the surface of the rubber. The idea is that when the tire comes in contact with the road the rubber is pressed back and the points project, gripping the road like claws.

This action of the wire is secured until the tire is worn down completely past the bottom of the wire loops. According to the manufacturers of the tire, the non-skid quality will be maintained for 6,000 miles, and besides being proof against skid are also of such a nature as to reduce the chances of puncture, eliminate the possibility of stone bruise and protect the side walls against blow-out.—Midgley Tire & Rubber Co., Lancaster, Ohio.

Nesco Portable Refrigerator

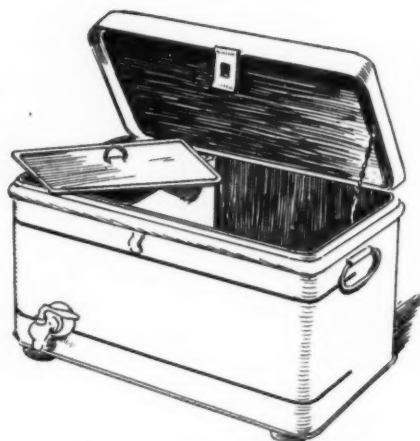
Very often the automobilist desires to carry with him a quantity of fresh food for a trip where a picnic lunch is indulged in. In order to keep the food on such a trip fresh and cool, the Nesco refrigerator has been brought out especially designed for the purpose. It is contained in a convenient size metal case with side handles so that the entire outfit can readily be moved from one



Opesco hood and radiator shell for Fords



Midgley non-skid tire in section



Nesco portable refrigerator

place to another. The measurements of the box are 17¼ by 12 by 10½ in. and the outfit includes a granite enamel water cooler with a nickel-plated faucet which screws into the cooler making cleaning easy. The box is made with rounded corners as shown herewith and is made in two styles, either japanned oak or japanned white. The list price either style is \$50 per doz.—National Enamelling & Stamping Co., Milwaukee, Wis.

Opesco Hood for Fords

A new hood and radiator shell for Fords under the name of Opesco is being manufactured which not only gives a new style of hood line but also alters the outward appearance of the radiator, effecting considerable change in the appearance of the whole front of the car. The equipment has a shell which fits over the radiator and the whole is rigidly attached by means of a hood ledge which is part of the outfit and is fastened to the dashboard. The lower part is held

by the regular Ford radiator fasteners. The hood is of heavy steel finished in two coats of baked enamel. The radiator shell may be finished in nickel, if desired. Price, \$15.—The Ouchie Specialty Co., Detroit, Mich.

Positive Split Rim Tire Remover

A positive tire remover is designed to take the tire from split rims in a short time without prying, hammering, or running any danger of injuring the casing or rim. Many difficulties have been encountered in the moving of detachable rims from casings, and it has always been a difficult task where the casing showed any tendency to stick. The subsequent hammering has often damaged rims to such an extent as to make them practically useless.

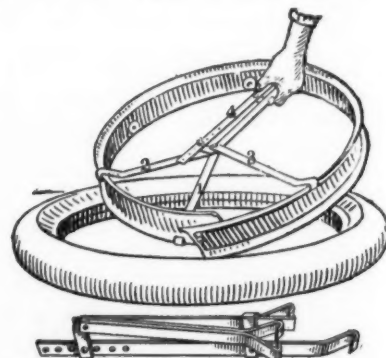
With the positive remover the rim is drawn together evenly and sprung out of line. It can be folded up to fit in the tool kit of the car and can be adjusted to fit any size rim. Its weight is 3 lb., and it is sold for \$2.—Positive Supply Co., Davenport, Iowa.

So-Luminum Aluminum Solder

The latest aluminum solder evolved is called So-Luminum which is designed to render possible perfect soldering of broken aluminum parts without recourse to welding. The new preparation is too hard and strong to permit of using a soldering iron, though the metal runs at a very low temperature and tins quickly. A gasoline torch is the only thing that is necessary and the So-Luminum is claimed never to break at the soldered point while there is no oxidization. Lost bits of aluminum can be replaced by building up and are said to be found harder than the original under the hammer test. So-Luminum is claimed to take the place of welding and to do the work in one-fourth the time at one-fourth the cost.—So-Luminum Mfg. & Engineering Co., New York City.

High Power Magnet Charger

In order to permit car owners to do their own charging of magnets for magnetos, a simple device has been desired for some time. The new high-power magnet charger is designed to fit the needs of either the repairman or private owner,



Positive split rim tire remover

and is a compact instrument which can be readily operated by any one. The charging box is compact, of light weight and simply operated. The horseshoe magnet is removed from the magneto, placed against the opposite poles in the charging box and then pressed down into the box where the coils are located. The current is then switched on and off and the magnet is charged. The outfit sells for \$15 complete.—C. C. McDonald Electric Co., Chenoa, Ill.

Topping Jack

Since the advent of the automobile there has been a demand for safe, efficient and easy-working jacks. The Topping jack, built on the same principle as a locomotive jack, that is, operating by means of a screw, has recently been introduced with these features.

The special feature of the jack is the screw, which produces a rise at both ends, the jack therefore working twice as fast. No appreciable increase in effort is required to operate it. On the center of the screw is fitted a bevel gear which meshes with a bevel pinion, this pinion being actuated by a ratchet into the socket of which the handle is fitted.

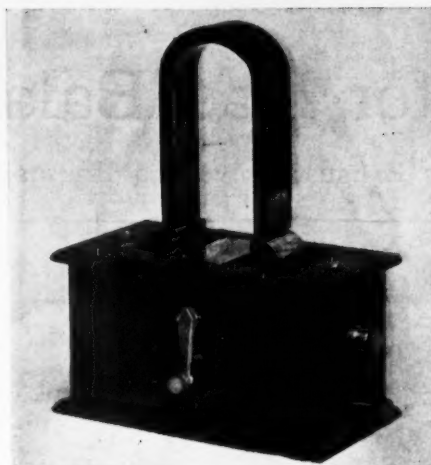
On the upper end of the jack is a right-hand thread which engages with the traveling lifting head and the left-hand thread on the lower end with the standard. Both the head and standard are inclosed in a protecting case or shell, out of which they emerge as the jack is operated. The jack is reversed by throwing over a small pin located at the base of the handle socket. Another feature is that the swivel top is removable and can be replaced by another swivel top having a side spur for low set axles as shown in the accompanying illustration.

The passenger car jack, which has a rise of 7 in., costs \$6.50 with an extra charge of 50 cents for the side lift. The truck jack with a similar rise costs \$8.50.—Topping Bros., 122 Chambers Street, New York City.

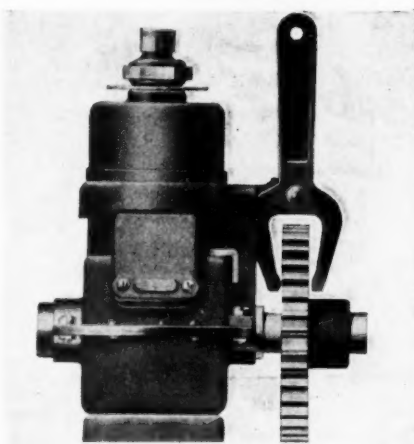
Stevens Products

Breaking off a cylinder-head or water-connection bolt in the hole is often a serious matter to the owner of a Ford car, because of the difficulty of getting out the stub and keeping the threads clean and intact. The work is easily done, however, with a Stevens set which includes a drill of the proper size to drill out the bolt, leaving only a small amount of metal in the threads; a bushing which goes in the clearing hole in the cylinder head to guide the drill—solving what is perhaps the most difficult part of the problem; and a tap to clean out the threads ready for the insertion of a new bolt. The set is inclosed in a neat case and sells for \$1.

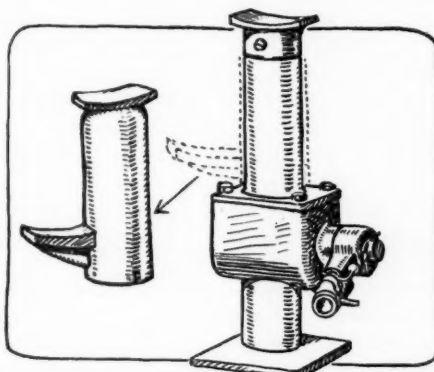
Another product of the company is a gasoline valve for Ford cars which is arranged to stop the supply of fuel to the



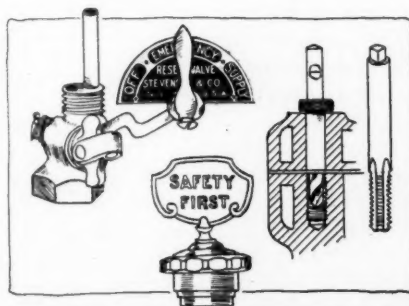
McDonald high-power magnet charger



Improved Stewart single-cylinder tire pump



Details of the Topping jack which operates on the screw principle



Above—Stevens gasoline valve for Fords. Right—Drill, bushing and tap for removing sheared bolts. Bottom—Safety radiator emblem

motor and so warn the driver when there is 1 gal. left; turning the valve to the emergency position permits this gallon to be used. Another position of the handle shuts off the supply altogether, locking the car. The device is screwed into the tank and the indicating dial and the handle are attached to the heel-board. The valve can be installed by the owner. Price, \$1.

To help keep in the driver's mind the Safety First idea the Stevens concern has placed on the market a neat radiator emblem, consisting of a radiator cap surmounted by a plate bearing the words "Safety First" in white letters on a green ground—the official colors of the "Safety First" Society. The emblem is adapted to any car. It sells at 75 cents.—Stevens & Co., New York City.

Stewart Tire Pump

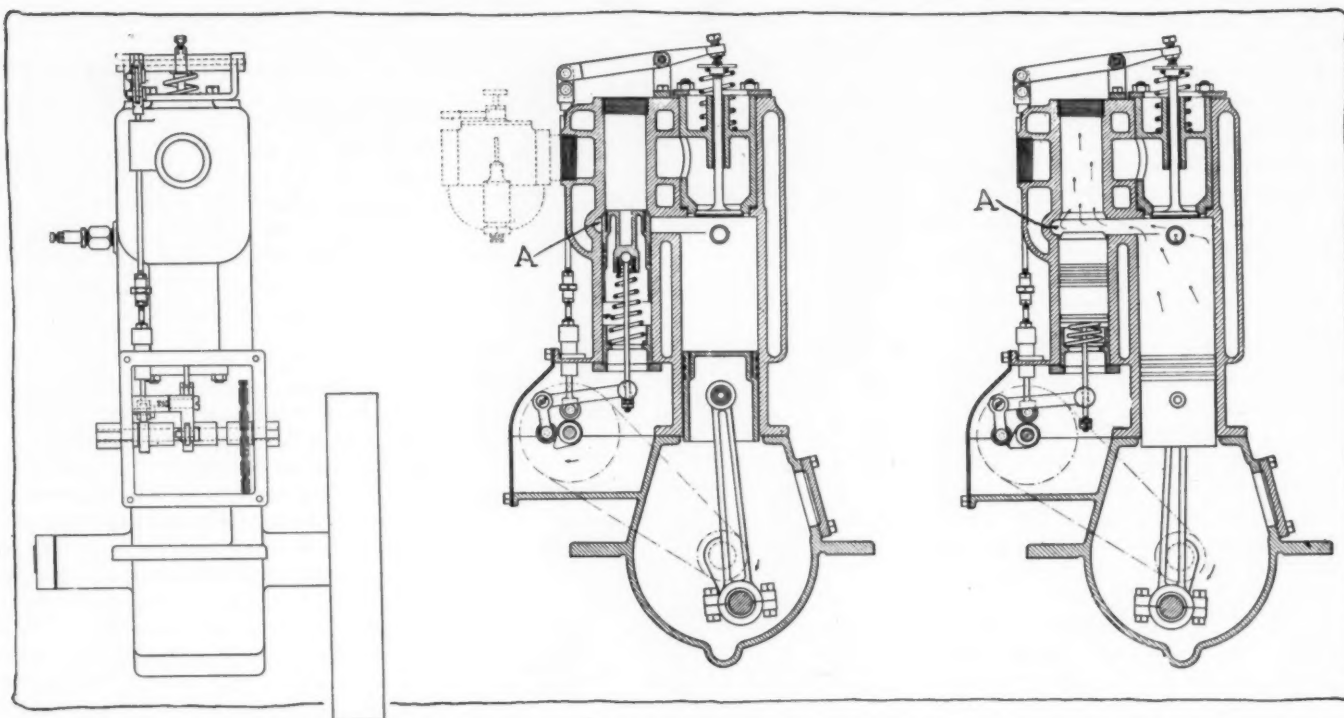
The Stewart single-cylinder tire pump has been improved in several details. The piston is fitted with one large ring and a unit of five small rings. Rigidity of attachment is insured by providing four bolt holes in the flanged base. The shifter arm is a separate part and can be set at any angle required by the space available for the installation of the pump. A brass coil connects the outlet valve with the hose and acts as a radiator, preventing the sending of hot air to the tire in case the operator should neglect lubrication for a long period. The pump is furnished complete with attachments for attaching to any standard car on the market. Price, \$15.—Stewart-Warner Speedometer Corp., Chicago, Ill.

Titan Bronze for Manufacture

A new metal which is designed to take the place of brass castings, and also to cheapen the cost of manufacture, for certain purposes, has been brought out in the form of a bronze known as Titan. The new metal has a tensile strength, according to its manufacturers, of from 75,000 to 85,000 lb., and an elastic limit of 40,000 to 48,000 lb. The reduction of area is said to be from 45 to 50 per cent and elongation 22 to 30 per cent, thus enabling its use in many places where steel has been used but where bronze would have been preferable. The advantage over steel is said to be principally in its corrosion-resisting qualities. The metal can be worked hot and where the reduction in manufacturing cost enters, is due to the use of a method by which the gear makers can cast it in sand or iron hills and then press it into a die of correct size. This gives a process with many of the advantages of die casting principally in that the machining costs for finishing are avoided. The main uses of the new metal are given as for drop-forgings, hot-rolled thread bolts, screws, gears, pinions, etc.—Alpha Metals Co., Bellefonte, Pa.

Medanich Motor Has Balanced Exhaust

Semi-Automatic Exhaust Valve and Unusually Large Intake



Left—Side view of one-cylinder Medanich motor. Center—End section, showing exhaust valve close. Right—Exhaust valve open. A is the cylinder pocket which permits the gases to pass around the valve, balancing it and preventing it from sticking

A MOTOR which is featured by the possession of a balanced exhaust valve and an unusually large intake valve and port area, has been brought out by the Medanich Motors Co., Inc., Louisville, Ky. This concern was recently incorporated in that State with a capital stock of \$125,000 subscribed by local capitalists and has had since the early part of March a single-cylinder motor in daily operation driving a 3½-hp. generator at the plant of a local concern devoted to experimental work.

The illustration herewith shows a section of the motor with exhaust valve in closed and open position. The manner in which the exhaust valve springs clear of the operating mechanism, when the force of the exhausting gases gets beneath the seat and above the valve, is also shown. This and the unusual construction and type of valve and port shapes and arrangements make up the features of the new design.

Will Work on Kerosene

As will be seen from the illustration, the intake valve is an overhead poppet which is only noticeable from its unusual size and the size of the cage containing it. The intake passes from the side-outlet carburetor illustrated, around the cored exhaust passage and directly into the chamber above the valve. The passing of the exhaust ports directly through the intake passage preheats the mixture, and it is one of the claims of the inventor of this motor that, due to this heat, it will operate on kerosene with the usual type of carburetor.

The semi-circular, cylinder pocket A, in the upper portion of the exhaust valve chamber permits the mixture under compression and the burning gases during explosion to pass entirely around the exhaust valve, thus permitting it to balance itself and preventing it from sticking against the cylinder wall. When the exhaust valve is open, any pressure in the cylinder tends to force the valve back upon its springs, com-

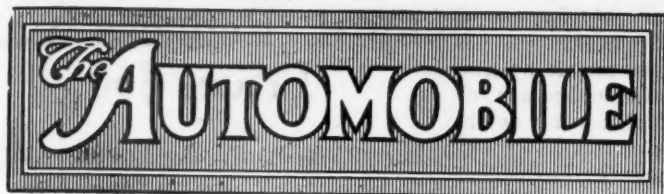
pressing same. This is done whenever the exhaust cam touches its bell crank with sufficient force to pull the valve down a minute fraction of an inch and break the seal of the valve seat. When this is done, the force of the out-rushing exhaust gases forces the valve downward against the spring. The cam is so arranged that the valve will not close when the cylinder pressure falls before the pressure of the spring, but will be held open by it until the cylinder is completely scavenged.

It is stated that the cylinder pocket surrounding the exhaust valve at A is so small that the economy of operation is not affected. Carbonization of this balancing port is also stated to be avoided by the thorough scavenging which takes place at each exhaust stroke.

The unusually large size of the intake valve and its cage will be noted from the section. With this arrangement the proportion of valve diameter to cylinder diameter is 2 to 3, thus a cylinder of 3-in. bore would have an intake and exhaust valve 2 in. in diameter. The manner of driving this valve is shown clearly, the cam acting directly upon a roller follower and thence to a vertical pushrod with a cross bell crank lever at the top. Throughout, the entire design is intended to provide a motor which will be capable of high rotational speeds.

Begin Work on Massachusetts Roads

BOSTON, MASS., July 20—Work has commenced upon the Massachusetts small town roads, and highways are under construction in about 350 places. Before the work is ended \$900,000 will be spent, not including the \$2,500,000 provided for the western part of the State. The commission has about \$750,000 for State highways and about \$600,000 has been allotted to some fifty cities and towns.



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Wanted, Better Detail

THE characteristic of the 1916 automobiles which so far have been announced that is most conspicuous is better motors. Having adopted the high-speed type, the American engineer has developed it to a high pitch with great rapidity, and he has good reason to fear no competitor when high-power efficiency is the point at issue. This is a fine thing to be able to say, and the men responsible are greatly to be congratulated, but in thus expressing belief in the very real nature of the progress made, attention may be drawn to other opportunities for engineering skill to show itself.

Most automobiles, whether good or medium in quality, develop many small noises when they have done over 5,000 miles. The universals sometimes rattle a trifle, the brake rods work loose, the control becomes a little less precise, and the motor may be even better than it was when new, but the chassis certainly deteriorates in detail from the first time it goes on the road.

For years we were satisfied with crude motors, but we shall never be again. So with the petty detail. Once it is improved by painstaking thought and careful experiment, the user will soon look for and expect the perfection of small detail which makes for continued, complete satisfaction. With soundless motors the least little chinking noise in the chassis becomes irritating to the average man and maddening to the mechanically hyper-sensitive. To remove

these noises and to make the chassis easier to look after at the same time needs about one-thousandth part of the attention that the motor has received. The work when done is not of a showy order, but the owner of the car will notice it soon enough when he starts his second season's driving.

A Chance for Spring Makers

IN several of the leading British automobile journals lately there have been comments and correspondence on the subject of springs, doubtless because the normally fine roads of the United Kingdom are badly cut up by heavy military traffic. While opinions differ a good deal in detail, there stands out as a prominent fact the idea that American cars are better sprung than European.

Against the opinion thus expressed we find criticism that the rear springs are often too free on American chassis and that shock absorbers are necessary to obtain the best effect. However, when it is remembered that the springs which go to Europe on American cars are designed to suit rough dirt roads primarily, and therefore are not fully suitable for a better class of surface, one is forced to the conclusion that the American spring must be very good indeed. At the moment the British and Continental motor car factories are not producing automobiles in any quantity except where they are making for the war departments, which means that the demand for parts to suit normal designs of cars is small. But directly after the war, when the factories get once again into full swing, should be a golden opportunity for the American spring makers to secure a permanent footing.

In order to supply the best sort of spring to suit European roads it would be necessary to study conditions on the spot; both of road and of chassis, but this should not be difficult. Any time during the next six months would seem to be particularly opportune for a visit to Europe by a few of our leading spring designers and there is good reason to think that this has been widely appreciated.

S. A. E. Assistance

WAR is a destroyer, the greatest destroyer of equipment in existence. Such destruction means replacing. The cheapest and easiest replacement is that accomplished when standardization is highest. It would be difficult to imagine any condition where standardization in army or navy work could be carried too far.

Because of this standardization aspect, the invitation of Secretary Daniels of the navy to the Society of Automobile Engineers, asking that it select two members for the Navy Advisory Board is most opportune, as we know of no other engineering society better qualified to give advice on this all-important work of standardization. Perhaps S. A. E. members are not so familiar with navy requirements as with army requirements, but the rudiments and elements of standardization are the same and the experience of the S. A. E. will be a most valuable asset to the board.

S. A. E. Issues New Data Sheets

Includes Information on New Standards and Reference Tables for Drafting Work

NEW YORK CITY, July 27—Members of the Automobile Engineers have been supplied with a number of additional data sheets for the S. A. E. loose-leaf handbook. These comprise in all seventy-two new data sheets, thirty-five being for Volume 1 and thirty-seven for Volume 2. Among the data sheets are those giving details of the most recently adopted standards of the Society putting at the disposal of draftsmen in the designing rooms of the different factories the standard dimensions which are of such value in the design of many parts of the car and its equipment. In fact, the supplying of the draftsmen with these dimensions is the practical cashing in on the long period of work done by the Standards Committee up to that time.

The new standards, now in data sheet form, include those on yoke and rod and pin dimensions, large hex spark plug shell, large diameter thread pitches, standard sizes of pneumatic tires, recommended practice for pleasure car frames, side outlet carbureter flanges, large sized flared tube ends and tees and the new specifications for ground return electrical installations on gasoline cars.

Horsepower Tables Extended

In addition, the table of horsepower values derived from the N. A. C. C. (formerly A. L. A. M.) formula has been extended to cover eight- and twelve-cylinder engines. Conversion tables of percentage of grade to angle of grade are also included. Piston displacement tables for eight- and twelve-cylinder engines of from 137.4 to 1531.5 cu. in. content are given. Two sheets are devoted to crank angles and corresponding piston positions. The effect of altitude on horsepower development of gasoline engines is treated on three sheets, with curves and formula. Diametrical and circular pitch tables, which are useful to engineers in laying out transmissions and other gear work, are given on four sheets. To the metric conversion data previously issued there has been added a table giving decimals of a millimeter for each thousandth of an inch. It is believed that this is the first time this information has been distributed generally.

Linear Units Table

The new table of standard linear units should be found very beneficial, as well as the conversion curve of miles per gallon to liters per 100 kilometers, enabling

the engineer to judge intelligently of gasoline consumption performance expressed in terms of the metric system. The sheets on the standardization of pipe thread gages, total keyway depth, equivalent values of electrical, mechanical and heat units and the economical selection of belts and pulleys, make the Handbook of greater value.

Simultaneously with the distribution of the new sheets, a revised index was issued containing exhaustive cross references in order that all data in the Handbook, which is now constituted of over 400 pages bound in two loose-leaf folders, can be located in a minimum of time. The members of the Society are furnished with a complete index for insertion in each volume of the Handbook.

As new standards now before the Society for mail ballot are adopted, additional data sheets will be issued. The Society also collects and prepares for publication other data than its adopted standards when the former are of direct interest to the automobile engineer and manufacturer, proper credit being given to the original sources.

The S. A. E. Handbook is one of the most valuable products of the Society. In addition to the official version of newly adopted and firmly established automobile engineering standards, it contains more data necessary in the automobile drafting room than are obtainable in any other one publication. It is the most important and useful of the handbooks in the engineering library of the technical man engaged in the automobile and allied industries.

Owen Leaves Chalmers to Become Saxon Vice-President

DETROIT, MICH., July 23—Percy Owen, general sales manager of the Chalmers Motor Co. has resigned to become vice-president of the Saxon Motor Co. where he will have entire charge of sales. Mr. Owen was one of the nine original organizers of the Saxon Motor Co. and still holds his original stock interest.

It is with the consent of Hugh Chalmers, president of the Chalmers Motor Co. that Mr. Owen goes to the Saxon. The agreement was reached some time ago, but Mr. Chalmers was unwilling for the actual change to take place until it could be arranged without impairment of the efficiency of his own organization.

Mr. Owen came to the Chalmers Motor Co. being at first eastern district sales manager. Then he came to the factory and after a short time was appointed sales manager, which position he held until June 1, when he was given the title of general sales manager. Before joining the Chalmers organization Mr. Owen was sales manager for the Carl H. Page Co., New York distributors for the Chalmers. Previous to that he was one of the pioneer importers.

Ford Reduces Car Prices \$50

Effective Aug. 1—Possible Rebate for Coming Year To Be Decided Later

DETROIT, MICH., July 28—Beginning with Aug. 1 the Ford touring car will be sold at \$440, and the roadster at \$390. This is a reduction of \$50 on each model as compared with the existing price during the past year.

Aug. 1 marks the opening of the fiscal year of the Ford Motor Co., and the company announces that no rebate is to be given persons buying Ford cars during August, September and October, but that it is possible a rebate will be decided upon later when the exact cost of manufacture, etc., which cannot be determined for several months, has been calculated. It is claimed that the roadster will be produced in much greater quantities than during the past year.

Canadian Ford Reduces Parts

FORD, ONT., July 26—The Ford Motor Co. of Canada, Ltd., has reduced the price on all spare parts for Ford cars by about 10 per cent. This means a saving from the former quotations of about \$60 for a complete touring car.

Stearns Cuts Four \$355

CLEVELAND, OHIO, July 24—A price cut of \$355 is the announcement of the F. B. Stearns Co. on the light four Knight car which last year sold for \$1,750 but which now sells, with the reduction, at \$1,395.

At this lowered price the company offers practically the same car as for the 1915 season but with improvements in body design and added mechanical refinements. The body refinements are not radical but merely detail changes to bring the appearance of the car up to the latest dictates of body fashion. Mechanically, the car is practically unchanged except for the addition of the Westinghouse lighting and starting system.

Crown Co. Incorporated

KALAMAZOO, MICH., July 27—The Crown Automobile Mfg. Co. has been incorporated, its capital stock being \$50,000. This is the new concern which recently purchased part of the former Michigan Buggy Co. plant to make a low priced four-cylinder car. The incorporators of the new company are: D. H. and W. B. Smith, Toledo, Ohio; Jas. H. Johnson, South Haven, Mich.; C. E. Kracht, Des Moines, Iowa; T. H. Walbridge, Toledo, Ohio; Ida Cadwallader, Fostoria, Ohio; J. B. Shifflet, Cleveland.

Trade Review of the Week

New England Busy—Northwest Slows Up—Sales in Central South Improving

NEW YORK CITY, July 28—The last week has shown no indication of a let-down in the amount of business done by Detroit and Indianapolis automobile and parts makers.

In Detroit nearly all of the factories are working at capacity and many of them are greatly behind in orders.

Behind in Shipments

Packard expects to ship its twelves to dealers in August, and begin shipments to customers in September. One-third of the Cadillac dealers were at the factory this week and reported conditions good in their territories. The 1916 Cadillac shipments will start the first of next week. Dodge is oversold. Hupp is behind with shipping orders; and Studebaker, Paige, Maxwell, Saxon and Hudson report the past week a busy one.

Parts and accessory makers report increased business the same as automobile builders. The demand is indicated by rapid strides in addition to plants and equipment. Among the concerns on which building operations are being pushed ahead are, Continental, Timken, Hyatt, and such car makers as Chalmers, Paige, Dodge, Hudson and Ford.

Indianapolis Demand

From Indianapolis are reports of continued demand from all parts of the country during the week. Marmon is working full force and its difficulty is getting materials to meet the demand. National says that the demand is double the supply. Pathfinder closed one of the most successful weeks in its career, one order alone calling for 600 cars. Stutz is moving along at its regular rate of 1500 cars a year production. Cole is concentrating its efforts on Southern business.

Minneapolis Slows Up

Reports from leading distributing centers such as Boston, Cincinnati, Minneapolis and Los Angeles show generally increased demands for cars.

In Minneapolis the expected slackup in sales at this season has begun to be felt by Twin City distributing houses. Distributors are burdened with orders they cannot fill. Field men from the territory report that the harvest has begun and farmers are not buying; they are too busy. A big business is expected in the fall, the outlook for the small grain crop being heavy. The only backward crop is corn. Many dealers throughout the ter-

ritory report prospects holding back in placing orders until several 1916 cars not yet announced are brought out. Radical price reductions are creating considerable disturbance with many buyers who purchased before the reduction. This fact is holding back buying as some anticipate further cuts. There is no market for used cars, price reductions in 1916 models having destroyed the market.

The Cincinnati territory which includes a good part of Ohio, Kentucky, Indiana and West Virginia reports business from 50 to 300 per cent ahead of a year ago. Maxwell business is double that of last year; Saxon is 300 per cent better; Studebaker 30 per cent better; Overland 100 per cent better, and so it goes with many of the more popular priced makes. Ford sold 200 cars in the last week as compared with 350 in the entire month a year ago. In the field of higher-priced cars, the demand is stationary except in one or two unusual cases. Locomobile reports a little better and so it is with Marmon, White, Pierce, and others. Winton business increased considerably the last week as compared with the preceding three weeks. Stutz and Mitchell report good business.

New England Awake

Conditions in New England have taken a surprising change for the better during the past ten days, warm weather and more settled buying conditions as a result of the blowing over of the announcement of new cars at heavy price reductions have generally improved the buying conditions. Immediate deliveries are wanted and it is apparent that manufacturers making 1916 announcements are losing sales. All of the New England distributors report similar conditions. Many Overland dealers have offered to increase their orders if they could obtain early deliveries. Maxwell signed more orders before the new sixteen was shown than they had taken a year ago, and 24 hours after the car was exhibited it would have been possible to have had 500 sales for immediate delivery had the cars been obtainable. Studebaker would require 1000 cars to meet its immediate demands and dealers are going direct to the factory with the hope of getting quicker deliveries. Briscoe and Interstate has had two big weeks, business being 50 per cent greater than in the entire preceding month. Buick is vastly behind in deliveries.

In the truck field improved conditions are noticeable. Autocar reports that while July is ordinarily a quiet month, business is holding up well. Mack and Saurer are making steady deliveries. Some of the other truck makers are not pushing the local market because of apparent heavy war orders which they are filling.

A New Six for \$1,000

\$750,000 Sun Motor Car Co. Enters Field—Secures Factory in Buffalo

BUFFALO, N. Y., July 27—The Sun Motor Car Co., has been incorporated with a capital stock of \$750,000 to manufacture a six-cylinder car to list at \$1,000 or less. The James silk mill property located in Buffalo and Lackawanna at the junction of the Buffalo, Rochester & Pittsburgh Railroad with parkway has been secured, the Sun company purchasing the entire property which embraces 4 acres. The Sun company will immediately occupy one story of this building which covers 17,000 sq. ft. In addition 6 acres of land adjoining this property has been purchased, and contracts for a new factory 600 by 150 ft. let. The new factory will be of reinforced concrete construction, is to be completed in 90 days and will employ 500 men.

The Sun Motor Car Co. has as its leading spirit R. Crawford, until recently sales manager of the Haynes Automobile Co., and also associated with him is R. C. Hoffman from the same concern. Mr. Crawford conceived the plan for a small six a year ago, and later organized the Automobile Engineering Co., an Illinois corporation, for the purpose of designing and building experimental cars.

The Sun six is fitted with a high-speed motor claimed to develop 55 hp. The company plans to build 2000 of these in the twelve months following the completion of the factory.

Already a selling organization has been developed and distribution will be largely confined to such centers as New York, Chicago, Boston, Philadelphia, Pittsburgh, Cleveland, Buffalo, Detroit, Cincinnati, Indianapolis, St. Louis, Kansas City, New Orleans, Minneapolis, Milwaukee, Omaha, Denver, Salt Lake City, San Francisco, Los Angeles, Dallas and Atlanta.

No Changes in Chalmers Co.

DETROIT, MICH., July 27—At to-day's annual meeting of the Board of Directors of the Chalmers Motor Co. no changes were made in the personnel of the company. Hugh Chalmers remains president, which thus quiets the recent rumors that he was to retire from the company. The other officials are: Lee E. Olwell, general manager; C. C. Hinkley, chief engineer; C. A. Pfeffer, secretary and assistant general manager; S. H. Humphrey, vice-president and works manager; C. A. Woodruff, purchasing agent.

Truck and Passenger Car Exports Gain \$7,570,770 Over May, 1914

Trucks Jump from 99, Worth \$127,024 in May, 1914,
to 2426, Valued at \$6,583,912 for This Year—
Passenger Car Increase Is 1664, Worth \$1,113,882

WASHINGTON, D. C., July 24—Details of the exports of motor cars during May and the 11 months of the fiscal year ending May, together with figures for comparative periods, just made public by the Department of Commerce, are of widespread interest. The figures show that the exports of commercial cars increased from ninety-nine, valued at \$127,024, in May, 1914, to 2426, valued at \$6,583,912, while during the 11 months' period these exports rose from 694, valued at \$1,061,354, in 1914, to the tremendous number of 11,006, valued at \$30,561,880 in 1915. The astounding increase in the exports of commercial cars since the outbreak of the European war has called atten-

tion anew to the wonderful productive capacity of the United States.

Passenger Cars Gain

The exports of passenger cars in May last amounted to 4821, valued at \$3,971,483, as against 3157, valued at \$2,857,601, exported in May a year ago. During the 11 months' period these exports declined from 26,324 cars, valued at \$23,522,981, in 1914, to 19,462 cars, valued at \$16,327,955, in 1915.

The exports of parts, not including engines and tires, increased in value from \$600,793, in May, 1914, to \$789,826, in May last, and from \$6,150,264 to \$6,714,001 during the 11 months' period.

Exports of motor car tires likewise show a healthy growth, the exports showing a gain from \$368,745, in May a year ago, to \$671,757, in May last, and from \$3,052,089 to \$4,224,408, during the 11 months' period.

United Kingdom Best Customer

The United Kingdom still leads all nations in the importation of American motor cars. During May the exports of cars to that nation amounted to 4036 machines, valued at \$5,895,856, while in May a year ago the number was 663 and the value \$556,753. During the 11 months' period the exports rose from 6982, valued at \$5,613,853, in 1914, to 11,688, valued at \$16,736,165, in 1915.

France's Contribution

France's contribution to the motor car manufacturers of the United States in May last was \$1,106,572 for 521 machines. The exports to that country in May a year ago amounted to 275 cars, valued at \$146,785. During the 11 months' period the exports to France in-

Exports and Imports of Automobiles and Parts for May and Eleven Preceding Months

| EXPORTS | | | | | | | | | |
|---|----------|-------------|--------|--------------|--------|-------------------------------|--------|--------------|--|
| Automobiles | | | | | | | | | |
| | | 1914 | | May 1915 | | Eleven Months ending May 1914 | | May 1915 | |
| | Number | Value | Number | Value | Number | Value | Number | Value | |
| Commercial | 99 | \$127,024 | 2,426 | \$6,583,912 | 694 | \$1,061,354 | 11,006 | \$30,561,880 | |
| Passenger | 3,157 | 2,857,601 | 4,821 | 3,971,483 | 26,324 | 23,522,081 | 19,462 | 16,327,955 | |
| Total | 3,256 | \$2,984,625 | 7,247 | \$10,555,395 | 27,018 | \$24,583,435 | 30,468 | \$46,889,835 | |
| Parts of (not including engines and tires)..... | | \$600,793 | ..... | \$789,826 | ..... | \$6,150,264 | ..... | \$6,714,001 | |
| Total automobiles and parts of..... | | \$3,585,418 | ..... | \$11,345,221 | ..... | \$30,733,699 | ..... | \$53,603,836 | |
| EXPORTS BY COUNTRIES | | | | | | | | | |
| Automobiles | | | | | | | | | |
| France | 275 | \$146,785 | 521 | \$1,106,572 | 1,286 | \$835,256 | 4,472 | \$11,142,414 | |
| Germany | 206 | 162,552 | ..... | ..... | 1,391 | 1,003,000 | 20 | 20,164 | |
| Italy | 33 | 25,846 | 23 | 17,004 | 326 | 228,894 | 111 | 75,372 | |
| United Kingdom | 663 | 556,753 | 4,036 | 5,895,856 | 6,982 | 5,613,853 | 11,688 | 16,736,165 | |
| Other Europe | 445 | 356,091 | 699 | 1,638,709 | 2,686 | 2,133,917 | 2,817 | 7,768,101 | |
| Canada | 764 | 941,345 | 838 | 630,990 | 4,111 | 5,277,752 | 3,606 | 3,796,729 | |
| Mexico | 4 | 3,601 | 3 | 4,407 | 164 | 252,098 | 67 | 68,067 | |
| West Indies and Bermuda..... | 34 | 31,374 | 262 | 131,779 | 491 | 468,467 | 1,383 | 827,989 | |
| South America | 180 | 169,107 | 165 | 88,631 | 1,909 | 1,888,529 | 1,071 | 583,119 | |
| British Oceania..... | 466 | 416,259 | 256 | 212,316 | 3,819 | 3,325,902 | 2,727 | 2,271,349 | |
| Asia and other Oceania..... | 118 | 124,910 | 241 | 588,116 | 1,993 | 1,927,157 | 1,581 | 2,708,004 | |
| Other countries | 68 | 50,002 | 203 | 241,015 | 1,860 | 1,628,610 | 925 | 892,362 | |
| Total | 3,256 | \$2,984,625 | 7,247 | \$10,555,395 | 27,018 | \$24,583,435 | 30,468 | \$46,889,835 | |
| Tires for Automobiles | | | | | | | | | |
| Belgium | | \$301 | ..... | ..... | ..... | \$15,730 | ..... | ..... |  |
| Germany | | 20,341 | ..... | ..... | ..... | 125,595 | ..... | \$6,090 | |
| England | | 148,512 | ..... | \$380,054 | ..... | 1,310,930 | ..... | 2,289,493 | |
| Canada | | 112,365 | ..... | 120,322 | ..... | 792,961 | ..... | 661,722 | |
| Cuba ..... |  | ..... | ..... | 22,170 | ..... | ..... | ..... | 161,023 | |
| Mexico | | 3,483 | ..... | 17,916 | ..... | 109,371 | ..... | 98,966 | |
| Australia ..... |  | ..... | ..... | 19,985 | ..... | ..... | ..... | 180,721 | |
| Philippine Islands | | 5,808 | ..... | 16,368 | ..... | 127,165 | ..... | 225,807 | |
| Other countries | | 77,935 | ..... | 94,942 | ..... | 570,337 | ..... | 600,586 | |
| Total | | \$368,745 | ..... | \$671,757 | ..... | \$3,052,089 | ..... | \$4,224,408 | |
| IMPORTS | | | | | | | | | |
| Automobiles | No. dut. | | | | | | | | |
| Parts of (except tires)..... | dut. | | | | | | | | |
| Total automobiles, and parts of..... | | | | | | | | | |
| Automobiles | 18 | \$18,912 | 23 | \$47,968 | 278 | \$588,747 | 300 | \$490,784 | |
| Parts of (except tires) | | 131,776 | ..... | 40,080 | ..... | 715,344 | ..... | 766,049 | |
| Total automobiles, and parts of..... | | \$150,688 | ..... | \$88,048 | ..... | \$1,304,091 | ..... | \$1,256,833 | |
| BY COUNTRIES | | | | | | | | | |
| Automobiles | | | | | | | | | |
| France | 7 | \$9,971 | 10 | \$17,527 | 124 | \$287,351 | 57 | \$125,854 | |
| Germany | 2 | 2,559 | ..... | ..... | 19 | 43,387 | 6 | 13,606 | |
| Italy | 3 | 3,407 | ..... | ..... | 50 | 73,475 | 107 | 117,061 | |
| United Kingdom | 2 | 1,485 | 8 | 23,408 | 40 | 115,042 | 72 | 174,386 | |
| Other countries | 4 | 1,490 | 5 | 7,033 | 45 | 69,492 | 58 | 59,877 | |
| Total | 18 | \$18,912 | 23 | \$47,968 | 278 | \$588,747 | 300 | \$490,784 | |

creased from 1286 cars, valued at \$835,256, in 1914, to 4472 cars, valued at \$11,142,414 in 1915.

Under the heading "other Europe," the figures show that the exports of cars increased from 445, valued at \$356,091 in May, 1914, to 699 cars valued at \$1,638,709, in May last. The 11 months' period shows an increase from 2686 cars, valued at \$2,133,917, in 1914, to 2817 cars, valued at \$7,768,101. Truck exports undoubtedly helped to swell the total for the 11 months of 1915.

Germany failed to import any American-made cars in May last, but in May a year ago 206 machines, valued at \$162,552 were shipped there. During the 11 months' period Germany imported 1391 cars from this country in 1914, the value of which was \$1,003,000, while during the same period of this year the number was twenty and the value \$20,164.

Italy is the only other European nation that figures in the export returns and the figures show that only twenty-three cars were shipped there in May, the value being \$17,004. In May a year ago the number was thirty-three and the value \$25,846, while during the 11 months' period the number decreased from 326, valued at \$228,894, in 1914, to 111, valued at \$75,372 in 1915.

During May a year ago Canada imported 764 cars from the United States, the value being \$941,345 and this number was increased to 838 in May last, although the value dropped to \$630,990. A decline is also noticed in the 11 months' figures, the number in 1914 being 4111, valued at \$5,277,752, while in 1915 the number was 3606 and the value \$3,796,729.

West Indies and Bermuda

Surprising gains are shown in the exports to the West Indies and Bermuda. In May, 1914, there were thirty-four cars, valued at \$31,374, shipped to those countries, while in May last the number had increased to 262 and the value to \$131,779. During the 11 months' period the number increased from 491, valued at \$468,467, in 1914, to 1383, valued at \$827,989, in 1915.

Exports to South America show a decline from 180 cars, valued at \$169,107, in May, 1914, to 165 cars, valued at \$88,631, while during the 11 months' period the exports decreased from 1909 cars, valued at \$1,888,529, in 1914, to 1071, valued at \$583,119, in 1915.

During May, 1914, there were shipped from this country to British Oceania 466 cars, valued at \$416,259. In May last the number had fallen to 256 and the value to \$212,316, while during the 11 months' period the exports fell from 3819 cars, valued at \$3,325,902, in 1914, to 2727 cars, valued at \$2,271,349, in 1915.

Two hundred and forty-one cars were shipped to Asia and other Oceania in

May last, the value being \$588,116, while in May a year ago the number was only 118 and the value \$124,910. During the 11 months' period the exports were 1993 cars, valued at \$1,927,157, in 1914, and 1581 cars, valued at \$2,708,004, in 1915.

"Other countries" imported from the United States in May last a total of 203 cars, valued at \$241,015, while in May a year ago the number was sixty-eight and the value \$50,002. For the 11 months' period the exports were 1860 cars, valued at \$1,628,610, in 1914, and 925 cars, valued at \$892,362, in 1915.

Chalmers Opens Suggestion Contest

DETROIT, MICH., July 23—The Chalmers Motor Co. has promoted a suggestion contest which is open to every one of its employees, except officials, and will close Dec. 24. The winner will receive \$100. There are two prizes of \$50 each, five of \$20, twenty of \$5, twenty of \$2.50 and fifty of \$1.00.

The intention of president Hugh Chalmers in inaugurating such a contest is to have every member of the Chalmers force try and find something which will bring about or will lead to some improvement no matter in what department of the plant and no matter whether it applies to head or hand work, to shop work or office work. It may concern improvements in machinery, how to increase sales, how to reduce mailing or transportation cost, precautionary health and fire measures, advertising ideas, reduction in costs in any department, substitution of machinery for manual labor, etc.

Suggestions from heads of departments, superintendents, foremen, engineers, designers and inventors relating to other work than their own will also be considered.

Two S. A. E. Men for Advisory Board for United States Defense

NEW YORK CITY, July 24—Considerable interest is felt by members of the Society of Automobile Engineers because of the fact that Secretary of the Navy Daniels has requested the organization to designate two representatives to serve on the Advisory Board, of which Thomas A. Edison will be chairman, as announced some time ago. The Council of the Society has the matter of selecting the two members of the Committee before it and has asked for suggestions from the Governing Committees of the Society sections.

Kuqua Visits Southern States

INDIANAPOLIS, IND., July 24—S. J. Kuqua, vice-president of the Cole Motor Car Co., is making an extended trip through the Southern States investigating business conditions.

No Tires on Cars for Export

British Gov't Concerned Over Violations of Rubber Guarantee by a Few Makers

NEW YORK CITY, July 27—The British government has recently warned the Rubber Club of America in this city that it is greatly concerned over the violation of the rubber guarantee by a few car manufacturers who persist in shipping automobiles fitted with rubber tires to neutral countries, this shipping of cars with tires being a violation of the guarantee. According to the guarantee, tires can be shipped only to neutral countries such as Spain, Portugal, Greece, Holland, Norway, Sweden and Denmark by way of the United Kingdom, and by licenses obtained from the British War Trade Department in London.

Up to the present the agreement between the British government and the individual rubber manufacturers in America has worked out most satisfactorily and America is getting all of the crude rubber she wants, in fact the imports are in excess of a year ago. The present guarantee arrangements by which the British government permits rubber to be shipped to American makers dates to the end of January and up to the present time approximately 30,000 tons of plantation rubber coming from the Federated Malay States and Ceylon have been received. Since the opening of the war not a pound of rubber has been lost due to destruction of vessels carrying it and the price is remaining steady.

The present guarantee arrangements permit of all rubber manufacturers who sign the guarantee obtaining practically all the rubber they require, this rubber being consigned to the British Consul General in New York and only handed over to the importers with the necessary guarantee, the Rubber Club of America taking care of the necessary clerical work in connection with all imported rubber. Under the present arrangements motor cars shipped to the neutral countries mentioned must not be equipped with rubber tires, but the tires must be shipped separately by way of London, the matter resting with London whether the tires eventually reach their destination or not.

At a hearing last week before the Federal Trade Commission in Detroit, which was attended by many representatives from factories building automobiles and parts, the government was urged to take some action to bring about relief to American makers owing to the present rubber situation, this applying particularly to rubber export troubles.

Accessory Makers Can Join N. A. A. J.

Jobbers' Assn. Provides for Associate Membership—To Fight Mail Order Houses

CHICAGO, ILL., July 21—After a two-day session, the first mid-summer meeting of the newly-formed National Association of Accessory Jobbers, closed here to-day after more than 100 representatives of the accessory business, including makers and jobbers, discussed the evils now existing in their business. The first day's meeting was for members of the executive committee only but on the second day two open meetings were held and it was during one of these that a most important move was made to change the by-laws so as to provide for an associate membership to which accessory manufacturers are eligible. This caused many of those manufacturers present to sign application blanks for membership, thus making the association one containing makers and jobbers.

Fight Mail Order Houses

In the open meeting of to-day there were taken up a number of subjects which are of vital importance to everyone in the legitimate accessory business. Heading this list comes the recommendation that the Association start a campaign against manufacturers offering standard goods to mail order houses and leagues who list them in their catalogs at cut prices.

Dead Accounts Loss

It was pointed out by a number of members present that there is a tremendous yearly loss in the accessory business due to dead accounts, so it was recommended that a credit bureau be established to assist members in avoiding bad accounts and in making collections of those which were taken and are unpaid. W. K. Norris, of the McQuay-Norris Co., piston ring maker of St. Louis, Mo., brought to light some methods used by the dealers of St. Louis. He stated that in his city 10 per cent of the car owners buying accessories are "dead beats," which means that each one has beaten more than two firms. When a man refuses to pay one firm he still is in a position to purchase of another, but when two concerns have unpaid bills against a man that man cannot get credit in any member's house. The recommendation of establishing a credit bureau to assist the members of the N. A. A. J. was left over to be discussed at the next meeting in October.

One of the most difficult tasks the association must cope with is the defining

of jobber and dealer, so it was deemed advisable to appoint a committee of ten consisting of five jobbers and five accessory manufacturers to formulate a list of jobbers, to be presented at the next meeting.

Other subjects discussed were: Reversed telephone charges and how this evil may be eliminated, so as to make it equally fair for dealer, jobber and maker. Parcel post shipments it was ordered should be sent with a lump charge for carriage and insurance. Uniform terms have been adopted and these are not to exceed 2 per cent cash, ten days, thirty days net. A standing committee of three was appointed to be known as the railroad committee and that this should handle all matters relating to rates, freight shipments and similar matters.

Return Goods Evil

The return goods evil was another taken under consideration and it was ordered that when a bill is correctly filled by the jobber no credit will be allowed for return goods unless a full explanation has been made and the consent of the association obtained and with this done, a charge of 10 per cent will be made for service and shipping expenses and the credited amount for the goods will be based on the prevailing price when the goods are returned.

Fees Reduced

The initiation fee has been reduced from \$500 to \$100 and the annual dues not to exceed \$300 which are to be paid in the form of assessments. The manufacturers taken as associate members are to pay \$100 yearly dues and no initiation fee.

The following jobbers were present at the meeting to-day: Julius Andr  & Co., Milwaukee, Wis.; Automobile Supply Co., Detroit, Mich.; Fred Campbell, St. Louis, Mo.; Electric Appliance Co., Chicago, Ill.; Philip Gross Hardware Co., Milwaukee, Wis.; Herring Motor Co., Des Moines, Iowa; Weinstock-Nichols Co., San Francisco, Cal.; Motor & Machinists Supply Co., Kansas City, Mo.; Excelsior General Supplies Co., Chicago, Ill.; Nebraska Buick Auto Co., Lincoln, Neb.; Nichols, Dean & Gregg, St. Paul, Minn.; Weinstock-Nichols Co., Los Angeles, Cal.; Kansas City Automobile Supply Co., Kansas City, Mo.; Minneapolis Iron Store Co., Minneapolis, Minn.; Motor Car Supply Co., Chicago, Ill.; Reinhard Brothers, Minneapolis, Minn.; General Sales Co., Detroit, Mich.; Western Motor Car Supply Co., Minneapolis, Minn.; Gibson Co., Indianapolis, Ind.; Interstate Electric Co., New Orleans, La.; Walkerville Hardware Co., Walkerville, Ont.; Sieg Iron Co., Davenport, Iowa; Weinstock-Nichols Co., Oakland, Cal.; Washington Auto Supply Co., Washington, Ill.

Chicago Fights Fenders for Trucks

Owners, Dealers and Manufacturers Claim They Are Unnecessary Expense

CHICAGO, ILL., July 20—Chicago's truck fender situation bobbed up again to-day, when the reports of the big truck users, truck manufacturers and the local motor trade association, were presented to Chief of Police Healy for consideration. It will be remembered the chief received on July 6 the reports of the three men acting for the city in the testing of these fenders, and because of lack of knowledge of the situation, took the suggestion of one of the local dealers to postpone the meeting for two weeks before making any definite decision.

Fender Makers Organize

To-day's discussion brought no definite results. There were present representatives of such large establishments as Armour & Co., the Consumers Co. and the Chicago Telephone Co. also members of the Chicago Assn. of Commerce and the Chicago Automobile Trade Assn. The makers of the six truck fenders were there and they have themselves formed an association calling it the Fender Manufacturers' Assn.

There were arguments from both forces and a fair judge of the situation does not have to go deeply into technicalities to hand over a decision in favor of the truck users and makers and against the fender makers and others who would have commercial vehicles equipped with costly, unnecessary front fenders.

Pedestrians' Negligence

Perhaps the pro-fender contingent was hit hardest by the words of Russel Huff, consulting engineer for the Packard Motor Car Co., and nominee for president of the Society of Automobile Engineers. Mr. Huff stated in a letter to the Chicago Automobile Trade Assn., which was read at the meeting, that front fenders do not protect, do not save lives and that of all the accidents due to the wheels passing over a body 90 per cent are caused by the rear wheels, and not the front, striking the person. Also that trucks are responsible for less than 50 per cent of the motor vehicle accidents and 10 per cent of these are caused by front-wheel contact. Also that of this 10 per cent the majority of accidents is caused by negligence on the part of the pedestrian.

"Why should Chicago manufacturers and merchants spend more than \$2,000,000 for an accessory for motor trucks which does not do that which we would have it do—eliminate the larger number

of accidents? Why should these business men spend a vast amount of money for something which is in its experimental stages?" These were two strong questions asked of those who wish the fenders adopted. The fenders do not protect and this is proved by statistics and if the fenders did protect pedestrians and save lives, then they certainly are desirable.

Practically every representative at the meeting stated that his concern would most willingly buy fenders and pay more than for the present makeshifts, if the fenders would save lives. But the fenders submitted to the city, for application to the front of the truck, do not save lives, as coroners' statistics show, is the contention of one of the men opposed to the adoption of the present contraptions.

As the situation now stands the ordinance provides that commercial cars only be equipped with fenders.

ArBenz Has New Four

CHILLICOTHE, OHIO, July 26—The ArBenz Car Co. has placed on the market a new four-cylinder model which is to sell for \$675. It is fitted with a 3½ by 5 block motor with a removable cylinder head which is cooled on the thermo-syphon plan. The transmission elements include a cone clutch, three-speed selected gearset and full floating rear axle. The wheelbase is 108 in., and tires are 30 by 3½. Equipment includes a one-man top, electric horn, Stewart speedometer and electric starting and lighting apparatus.

Menominee Electric at \$1,250

MENOMINEE, WIS., July 24—The Menominee Electric Mfg. Co. has completed the first of the electric carbriolets which it intends to manufacture to sell at \$1,250, an unusually low price for an electric. The car has a wheelbase of 108 in., is fitted with Exide batteries and Goodyear cord tires. It can be charged for a distance of 50 to 60 miles and is capable of 18 to 20 m.p.h. The car weighs approximately 1800 lb. Doors are wide and the leather top can be let down. The body is painted a royal blue with black hood and back. A charging outfit it furnished with the car by which it is possible to charge the batteries direct from an electric light socket. The company expects to make 150 cars the first year.

Maurer Amplex Factory Manager

SOUTH BEND, IND., July 24—LeRoy F. Maurer, formerly chief engineer of the Amplex Mfg. & Machine Co., Mishawaka, Ind., has been appointed factory manager. The company is evolving a valveless two-cycle motor along the lines of the old Simplex, designed by Mr. Maurer.

Olds 8 Will Be Different

Appearance Varies from Other Models—120-In. Wheelbase and Delco Electric System

LANSING, MICH., July 26—First details of the new \$1,295 eight-cylinder model which has been added by the Olds Motor Works reveal that the car is strikingly different in appearance from other Oldsmobiles. The hood, which covers the conventional V-type motor with cylinders 2½ by 4¼ in., is rounded at the top with the radiator in the form of a half ellipse. Side lamps are eliminated and for city driving smaller lamps are mounted on top of the headlamps.

The wheelbase is 120 in., tires being 33 by 4 straight side, and the transmission elements include a cone clutch, three-speed gearset and floating axle with spiral type gears. Engine and gearset are a unit. Springs are semi-elliptic front and three-quarter elliptic rear. Equipment includes Delco lighting, starting and ignition, electric horn, Stewart speedometer and clock.

Velie to Sell Direct Through Car Dealers

MOLINE, ILL., July 24—The Velie Motor Vehicle Co., this city, which heretofore has distributed its products largely through the implement dealers which handle products of the John Deere Plow Co., with which the Velie company is closely allied, has altered its policy and henceforth will contract direct with responsible motor car dealers and distributors, eliminating the Deere Plow branches. This change presages no segregation from the John Deere Plow Co. interests insofar as the factory, directors or stockholders are concerned, the manufacturing influence and backing remaining the same.

Stutz Adds Two-Passenger Roadster

INDIANAPOLIS, IND., July 22—For all-around work the Stutz Motor Car Co., this city, has brought out a roadster model which is one of the series C designs produced at the present time by this concern. The roadster is a two-passenger car designed for those wishing a comfortable, roomy, easy-riding car of inclosed door type. It is fitted with a slightly lower gear than the Bearcat model and is therefore not as fast, being designed more for all-around use than for high speed. The body is of streamline design with the cowl dash merging into the hood lines providing an

attractive appearance. The door hinges are concealed.

The specifications of this car show that it is only manufactured with a four-cylinder motor. The motor dimensions are 4¼ by 5½ and the other important data regarding the chassis features include pressure oiling system; Remy electric lighting and starting; Stutz gearset and rear axle; Timken front axle; semi-elliptic front and rear springs; 34 by 4½ tires and 56-in. tread. The wheelbase of this tire is 120 in., and the price \$2,100. If wire wheels are desired a set of five will be furnished for \$100. Other than this the equipment is complete, at the purchase price.

Reo Adds 3-4-Ton Truck

DETROIT, MICH., July 27—The Reo Motor Truck Co. is bringing out a ¾-ton truck styled Model F which sells at \$1,075, completely equipped. The chassis only, less express body, driver's seat, canopy top and windshield, but otherwise completely equipped, lists at \$1,000. The truck, which is specially made for grocers, butchers, bakers and department stores, has a wheelbase of 120 in. The inside length of the standard express body is 96 in. and the width 44 in.

A four-cylinder, 4¼ by 4½, motor cast in pairs provides power. The carburetor is a Johnson and ignition is provided by a Remy generator. The starting and lighting system is also Remy. The clutch is a dry disk type; gearset is selective. Hyatt Roller bearings are used throughout. The rear axle is a floating and Timken bearings are used on the front axle. The artillery wheels have 34 by 4½ pneumatic tires, plain in front and knobby tread on rear. Springs are semi-elliptic. The gasoline tank holds 11 gal., the water tank 3 and the oil tank ¾ gal. included in regular equipment are head, tail and instrument lights, speedometer, ammeter, horn, tools, etc.

Carlston Kingston Chief Engineer

KOKOMO, IND., July 23—William S. Carlston, who during the last eight years has been assistant to George Kingston of Byrne, Kingston & Co., manufacturers of Kingston carburetors and mufflers, has been appointed chief engineer. He had charge of the experimental work and was active head of the engineering department during the past six or seven months, owing to the condition of Mr. Kingston's health.

Five Armored Trucks a Day

HARRISBURG, PA., July 26—The Motor Truck & Tractor Co., this city, is at present manufacturing five armored trucks daily for the Russian government, these being on a contract for 1400 recently received. Part of the contract has been sublet to the Baldwin Locomotive Works.

the court, \$50,000; interest, \$28,709.60; costs, \$3,274.94. Other suits in the accounting stage are against Goodrich and Republic, in Chicago, and against the Pennsylvania Rubber Co., in Pittsburgh.

Briggs-Detroit Creditors to Receive \$103,000

DETROIT, MICH., July 22—The creditors of three concerns for which the Detroit Trust Co. is trustee, will shortly receive a total of about \$103,000, as follows: 10 per cent to the creditors of the Briggs-Detroit Co., or approximately \$40,000; 2 per cent, or about \$50,000 to the creditors of the Michigan Buggy Co., this making thus far a total of 22 per cent dividends paid; 4 per cent, or about \$13,000 to the creditors of the American Voiturette Co. which makes a total to date of 24 per cent to the latter's creditors.

Field Opening in Russia

PETROGRAD, RUSSIA, July 10—The Pobeda Commercial House, this city is announcing that there is a large field in Russia for the sale of automobiles, trucks and motorcycles which will be open as soon as hostilities have ceased. The business formerly done with Germany, it is pointed out, will be transferred to other countries and the United States should get its share. The Pobeda house, whose address is 61 Moika, Petrograd, and whose American agents are Ladenburg, Thalmann & Co., New York City, state their intention of taking the agency of low, medium and high-priced cars at this time.

Tire Stocks Firm in Tone

Show Some Gains—Car, Truck Accessory Securities Show Little Change

NEW YORK CITY, July 27—Tire stocks were the only ones on the local automobile securities market to show particularly strong gains during the past week. Comparatively few changes of importance are recorded for any of the other issues, the general tone of the market seeming to tend toward dullness with some of the securities half a point or a point higher than last week, though some of them were lower. Kelly-Springfield common is ten points above last week's level, while its first preferred has gained a point and its preferred five. Miller common rose six points though the preferred is nine points lower than last week. U. S. preferred shows a gain of a point while Swinehart lost two. Goodrich preferred gained a half point and Goodyear common declined a point and the preferred a half point. Portage common added a point.

Of the car stocks, General Motors common is eight and a half points lower and the preferred a point higher than last week. Packard, Studebaker and the Reo stocks are half a point higher. White preferred is four points lower and Willys-Overland common five.

Gramm-Bernstein Gets Big Orders

LIMA, OHIO, July 26—The Gramm-Bernstein Co. is shipping trucks at the

rate of 125 per month. After accepting an offer for 500 vehicles, the company was compelled to turn down two other orders, one for 200 3-ton machines and the other for 200 2-tonners, owing to lack of production facilities, although the plant is running to capacity and is being quadrupled in size to meet the demand. The company is finding a large market for its product in England and France.

A. R. Pardington of L. H. A. Dead

DETROIT, MICH., July 28—A. R. Pardington, vice-president and secretary of the Lincoln Highway Association, of this city, who for the past two years looked after the management of the association, died at Parker Hospital today, where he had been ill for some weeks. For several years Mr. Pardington has suffered with a malignant disease which had seriously handicapped him. Mr. Pardington's associations with the automobile industry have extended over many years. He was instrumental in the building of the Motor Parkway, Long Island, and has long been connected with automobile sports, having refereed all of the 500-mile races on the Indianapolis Speedway.

Cole Closes Prosperous Year

INDIANAPOLIS, IND., July 24—At the annual stockholders' meeting of the Cole Motor Car Co. held to-day, the usual cash dividend was declared and a satisfactory amount carried into the surplus account. The company's annual statement shows that the last year has been one of the best in the history of the company.

Automobile Securities on New York and Detroit Exchanges

| | 1914 | | 1915 | | Wk's |
|-------------------------------------|--------|--------|---------|---------|--------|
| | Bid | Asked | Bid | Asked | Ch'ge |
| Ajax-Grieb Rubber Co. com. | 223 | .. | 300 | .. | .. |
| Ajax-Grieb Rubber Co. pfd. | 99 | .. | 100 | .. | -1 |
| Aluminum Castings pfd. | 98 | 100 | 98 | 100 | .. |
| J. I. Case pfd. | 82 | 85 | 70 | 79 | .. |
| Chalmers Motor Co. com. | 97 | 101 | 89 | 92 | -2 |
| Chalmers Motor Co. pfd. | 94 | 96 | 95 | 98 | .. |
| Electric Storage Battery Co. | 50 | 51 | 52 | 53 1/2 | -1 |
| Firestone Tire & Rubber Co. com. | 305 | 312 | 506 | 512 | .. |
| Firestone Tire & Rubber Co. pfd. | 108 | 110 | 109 | 111 | .. |
| General Motors Co. com. | 87 1/2 | 89 | 179 1/2 | 181 | -8 1/2 |
| General Motors Co. pfd. | 91 | 93 | 105 | 107 | +1 |
| B. F. Goodrich Co. com. | 24 | 24 1/2 | 50 | 51 | .. |
| B. F. Goodrich Co. pfd. | 88 1/2 | 90 | 104 1/2 | 106 | + 1/2 |
| Goodyear Tire & Rubber Co. com. | 174 | 178 | 269 | 272 | -1 |
| Goodyear Tire & Rubber Co. pfd. | 97 | 99 | 105 | 106 1/2 | - 1/2 |
| Gray & Davis, Inc., pfd. | 98 | 102 | .. | .. | .. |
| International Motor Co. com. | .. | 3 | 17 | 19 | .. |
| International Motor Co. pfd. | .. | 9 | 40 | 44 | -3 |
| Kelly-Springfield Tire Co. com. | 51 | 53 | 165 | 168 | +10 |
| Kelly-Springfield Tire Co. 1st pfd. | 75 | 80 | 86 | 87 | +1 |
| Kelly-Springfield Tire Co. 2d pfd. | 90 | 100 | 160 | 170 | +5 |
| Maxwell Motor Co. com. | 14 1/2 | 14 3/4 | 35 1/2 | 37 | - 1/2 |
| Maxwell Motor Co. 1st pfd. | 43 1/2 | 45 | 84 | 86 1/2 | +1 |
| Maxwell Motor Co. 2d pfd. | 17 | 19 | 31 | 33 | -1 |
| Miller Rubber Co. com. | .. | .. | 196 | 199 | +6 |
| Miller Rubber Co. pfd. | .. | .. | 94 | 96 | -9 |
| New Departure Mfg. Co. com. | 124 | 127 | .. | .. | .. |
| New Departure Mfg. Co. pfd. | 105 | 108 | .. | .. | .. |
| Packard Motor Car Co. com. | .. | 112 | 110 | 115 | .. |
| Packard Motor Car Co. pfd. | 97 | 99 | 97 | .. | + 1/2 |
| Peerless Motor Car Co. com. | 10 | 17 | .. | 70 | .. |
| Peerless Motor Car Co. pfd. | .. | 50 | .. | 87 | .. |
| Portage Rubber Co. com. | .. | 30 | 36 | 38 1/2 | +1 |
| Portage Rubber Co. pfd. | .. | 90 | 92 | 95 | .. |
| *Reo Motor Truck Co. | 12 1/2 | 13 1/2 | 15 1/2 | .. | + 1/2 |
| *Reo Motor Car Co. | 20 1/2 | 21 1/2 | 30 | 31 | + 1/2 |
| Splitdorf Electric Co. pfd. | 40 | 50 | .. | .. | .. |
| Stewart-Warner Speed. Corp. com. | 48 | 49 1/2 | 65 1/2 | 66 1/2 | - 1/2 |
| Stewart-Warner Speed. Corp. pfd. | 99 | 101 | 105 | 107 | +1 |
| Studebaker Corporation com. | 32 | 33 | 81 1/2 | 83 | + 1/2 |

| | 1914 | | 1915 | | Wk's |
|-----------------------------|---------|--------|------|---------|-------|
| | Bid | Asked | Bid | Asked | Ch'ge |
| Studebaker Corporation pfd. | 82 1/2 | 86 | 99 | 101 | .. |
| Swinehart Tire & Rubber Co. | 85 | 87 | 77 | 78 | .. |
| Texas Company | 130 | 131 | 130 | 132 | -2 |
| U. S. Rubber Co. com. | 56 1/2 | 57 1/2 | 43 | 45 | .. |
| U. S. Rubber Co. pfd. | 101 1/2 | 102 | 102 | 104 | +1 |
| Vacuum Oil Co. | 208 | 212 | 199 | 202 | +1 |
| White Co. pfd. | 107 | 110 | 99 | 103 | -4 |
| Willys-Overland Co. com. | 88 | 88 1/2 | 132 | 133 1/2 | -5 |
| Willys-Overland Co. pfd. | 93 | 95 | 102 | 103 1/2 | .. |

OFFICIAL QUOTATIONS OF THE DETROIT STOCK EXCHANGE

| ACTIVE STOCKS | | | | | |
|-----------------------------|--------|--------|---------|---------|--------|
| Chalmers Motor Co. com. | .. | 102 | 91 | -1 | .. |
| Chalmers Motor Co. pfd. | 94 | 96 | 94 1/2 | 97 | .. |
| Continental Motor Co. com. | 155 | 180 | 205 | .. | .. |
| Continental Motor Co. pfd. | .. | 75 | 82 | 86 | +2 |
| General Motors Co. com. | 88 1/2 | 90 1/2 | 178 | 183 | -9 |
| General Motors Co. pfd. | 90 1/2 | 91 1/2 | 105 1/2 | 107 1/2 | +1 1/2 |
| Maxwell Motor Co. com. | 13 1/2 | 14 1/2 | 35 1/2 | 37 1/2 | - 1/2 |
| Maxwell Motor Co. 1st pfd. | 42 1/2 | 45 | 82 1/2 | 84 1/2 | .. |
| Maxwell Motor Co. 2d pfd. | 15 | 19 | 31 1/2 | 34 | -1 1/2 |
| Packard Motor Car Co. com. | .. | 112 | 110 | 115 | .. |
| Packard Motor Car Co. pfd. | 97 | .. | 98 | 100 1/2 | +1 1/2 |
| *Reo Motor Car Co. | 20 1/2 | 21 1/2 | 30 1/2 | 31 1/2 | + 1/2 |
| *Reo Motor Truck Co. | 12 1/2 | 13 | 17 | .. | +1 1/2 |
| Studebaker Corporation com. | .. | .. | 81 1/2 | 83 1/2 | +1 |
| Studebaker Corporation pfd. | .. | .. | 99 | 101 | .. |

| INACTIVE STOCKS | | | | | |
|---------------------------|-----|--------|---------|----|------|
| *Atlas Drop Forge Co. | 19 | .. | 26 | .. | .. |
| Ford Motor Co. of Canada. | .. | .. | 147 1/2 | .. | +125 |
| Kelsey Wheel Co. | 185 | .. | 205 | .. | .. |
| *W. K. Prudden Co. | .. | 20 1/2 | 19 1/2 | 21 | .. |
| Regal Motor Car Co. pfd. | 20 | .. | 15 | 25 | .. |

| BONDS | | | | | |
|----------------------------------|-----|---------|--------|----|----|
| General Motors, notes, 6s, 1915. | 100 | 101 1/2 | .. | .. | .. |
| Packard Motor Co. 5s, 1916. | 95 | 98 1/2 | 98 1/2 | .. | .. |

*Par value \$10; all others \$100 par value.

Match Race Aug. 7 in Chicago

Resta, DePalma and Cooper Take Up Oldfield's Challenge for 100-Mile Contest

CHICAGO, ILL., July 27—As a result of a challenge hurled at Dario Resta and Ralph DePalma last week by Barney Oldfield, the Chicago speedway will be the scene of a 100-mile match race Aug. 7, when four, and perhaps five, of the most noted drivers in the country will meet to settle a much-mooted question of supremacy. Resta already has accepted Oldfield's challenge and Bob Burman and Earl Cooper have challenged the challenger in turn and they will be accommodated by Barney. Ralph DePalma has not been heard from as yet but it is thought that the winner of the 1915 International Sweepstakes is too good a sportsman to decline the issue and that he will participate in the match race.

In his challenge, Burman offered to give Oldfield and Resta a 2-mile handicap if they would permit him to drive his 350-in. Peugeot, but neither would accede to such a request and consequently Burman will drive his 300-in. car. Cooper will be at the wheel of a Stutz and claims the title of America's champion in an American car.

Oldfield will enter the lists at the wheel of the Grand Prix Delage that David G. Joyce, the local sportsman, imported recently from France for Barney's use.

The management of the Chicago speedway has hung up \$7,500 for the race, the purse to be divided as the contenders see fit. The contest will be made an annual event and a silver trophy will be awarded the winner. According to the deed of gift, any driver capturing three 100-mile races will come into permanent possession of the challenge cup.

The winner of the Aug. 7 race probably will crowd the 100 miles inside of an hour. The 100-mile record for the Chicago track is 99.08 m.p.h., established by Porporato's Peugeot in the first century of the 500-mile derby of June 26. There were twenty-two cars on the track and he was forced to stop for a tire change before he completed the first 100 miles. It is thought that with only four or five cars on the course, much faster time will be made.

Plan Speedway for Dallas

AUSTIN, TEX., July 24—Plans are being laid by a number of the leading automobile men of Texas for the inauguration of a movement to build a first-class speedway at some point in the State. It is probable that Dallas will be decided

upon as the location of the new racing course. While the plans for the enterprise have not as yet taken definite shape, it is stated that the Indianapolis speedway will be largely patterned after. A partial canvass of automobile manufacturers and racing men has been made with the view of sounding their sentiment toward the project and it is stated that it promises to meet with universal cordial support. It is expected that public announcement of the preliminary plans will be made soon.

Allison Buys Two Peugeot Racers — Aitken in Charge

INDIANAPOLIS, IND., July 26—James A. Allison, secretary-treasurer of the Prest-O-Lite Co., and one of the four owners of the Indianapolis Speedway, has purchased two Peugeot racing cars which are to be raced in American speedway events, the cars in all probability to be entered in the Minneapolis and New York speedway races this fall. John Aitken, well known in racing by his connection with the National cars, will have charge of the two Peugeots which are described as the machines driven by Goux and Boillot in the 1914 French Grand Prix road races. This is the first step taken by the speedway people in the possible solution of the present difficulty of not having enough cars for the present speedway circuit. Mr. Allison during the recent Indianapolis Speedway meet suggested the possible necessity of the different speedways purchasing cars until such time as American makers can build to meet speedway requirements.

Two Stutz and Mercer for Elgin

CHICAGO, ILL., July 27—Two Stutz cars with Cooper and Anderson as drivers, have been entered in both races at Elgin. Henning's Mercer has also been entered in Friday's race, so the entries total ten to date.

Speedway for Cleveland

CLEVELAND, OHIO, July 23—A 2½-mile speedway is to be built near Cleveland by a company which filed incorporation papers in Columbus recently. The speedway is to cost \$700,000. Four hundred acres near the city limits have been acquired. M. L. Yuster, founder of the Yuster Axle Co., is the promoter of the project.

Sheepshead Speedway Ticket Office

NEW YORK CITY, July 25—The Sheepshead Bay Speedway Corp., is preparing to open an office for the sale of tickets at 1696 Broadway, this city. The executive offices remain at 17 Battery Place.

Detroit Speedway Hits a Snag

Little Progress Made on Stands or Track—No Race for Labor Day?

DETROIT, MICH., July 26—The Detroit Motor Speedway, which has for several months been in the public eye, by its broadly advertised plans to build a speedway here, and for which it has been selling admission tickets for a Labor Day meet Sept. 6, has made little progress to date and it is almost impossible to have a meet on that date. The track has been advertised as a 2½-mile cement oval, 90 ft. wide. None of the cement has been laid and it would be a physical impossibility to have such a track completed by Labor Day. The erection of grandstands has not yet been started, although it has been stated in publicity that work has been started on the stands to seat 100,000 people. Widespread publicity has been sent out to the effect that the track had received sanction for a Labor Day meet, but this is not true, as the American Automobile Assn. has not granted such sanction.

Up to the present the speedway organization has been expending large efforts in selling stock, and has disposed of \$103,330 worth of stock at \$10 per share to over 300 small investors in Detroit, this being exclusive of stock sold to the officials of the organization. Holdings run from two shares to 200. Over \$72,000 has been secured in cash by this stock sale and the remainder taken in notes. These figures are based upon a report from the Michigan Sureties Commission, and refer to the original stock issue of \$500,000. After the balance of this issue was turned over to the contractor, the stock was increased to \$800,000, so that there would be some to sell on the same basis as before but it is understood little of this has found a market.

When asked concerning the situation, S. D. Maddox, general manager and vice-president of the speedway organization, gives his explanation of the matter by saying that any reports circulated have been just publicity. Detroiters began to get skeptical of the speedway advertising and publicity as there were only thirty-six working days in which the track could be completed. Examinations of the speedway property showed that the entire gradings of the turns had not been completed and that there were not 500 men at work as stated. Recently John B. Whelan, president of the Detroit Motor Speedway, when interviewed by THE AUTOMOBILE representative, declared that he had every reason to believe the track would be ready for a

Labor Day meet, but concrete experts state that it would be a physical impossibility to have a cement track ready by that time or for weeks afterward.

The main difficulty with this speedway matter has been the lack of capital. When the present organization took over the work of its promotion, it was expected that Detroit people would respond readily but it was not easy to sell stock, and the work of grading the track proceeded slowly. Some time ago the contractor agreed to take the balance of stock remaining unsold in lieu of cash for his work, thinking that he could dispose of the stock and thus get sufficient funds to complete the work. Things have proven otherwise and to-day the contractor has the stock on his hands, being credited with figures 33,682½ shares worth at par \$336,825.

President Whelan declares that in the event of no race money collected on the sale of tickets will be refunded.

Practice Begins at Des Moines

DES MOINES, IOWA, July 25—Five thousand people saw Barney Oldfield set new mile course records at the formal opening of the new Des Moines Speedway here to-day. Oldfield negotiated 2 miles in 1:10 1/5, 105 m.p.h. in his front-drive Christy. He went the 5 miles in his Fiat in 3:01 4/5, 100 m.p.h. It was announced that both of the marks are new world's records for a 1-mile course.

Preliminaries for the 300-mile event of Saturday, July 31, will be staged on Wednesday and Thursday of this week. Only the twelve cars making the fastest time will be eligible. Entries are:

| Driver | Car |
|-----------|------------|
| O'Donnell | Duesenberg |
| Chandler | Duesenberg |
| Henderson | Duesenberg |
| De Palma | Stutz |
| Scott | Anderson |
| Strunk | White |
| Mulford | Mulford |
| Cooper | Sebring |
| Brown | Du Cheyne |
| Burman | Peugeot |
| Jones | Clergy |
| Donaldson | Emden |
| Vall | Mulford |
| Oldfield | Delage |
| O'Connell | O'Connell |

Denver-Cheyenne Record for Cadillac

DENVER, COL., July 24—Harold Brinker, of Cheyenne, Wyo., drove a Cadillac eight from this city to Cheyenne, 112 miles in 2 hr., 17 min. to-day, breaking the previous record of 2 hr., 43 min. Eleven cars started in an unofficial race between these two cities, promoted by the Denver Post. Leon Nelson of Denver was second in a Metz, in 2 hr. 53 min.

10,450 Cars in Dallas County

DALLAS, TEX., July 24—Dallas County is now said to lead any county in the South for the number of automobiles. The 10,450th number was issued this week.

100-Mile Race for Providence

\$10,000 Race on Narragansett Park Speedway Sept. 18 for 300-Cu.-In. Cars

PROVIDENCE, R. I., July 24—The Narragansett Park Speedway, Inc., will open its new 1-mile cement track which has been built for automobile and motorcycle racing on Saturday, Sept. 18, when \$10,000 in prizes will be offered for a 100-mile race open to cars of 300 cu. in. piston displacement and with a maximum weight not exceeding 2500 lb. Fourteen cars will be permitted to start, according to A. A. A. rules, and these will have to qualify at an average speed of 70 m.p.h. for two laps of the track.

Work on the track is being hurried at present, 100 men being employed, and it is expected that in 2 weeks the track surface will be completed. The surface is special asphalt mixture, resting on a deep layer of rock asphalt. In shape the track is an oval, varying in width from 75 to 81 ft. Inside of this track proper is an asphalt safety apron on which the cars can go in case of accident or if repairs have to be made. This apron is 14 ft. wide. The track is banked throughout its entire length, on the straight-aways 4 to 6 per cent and on the curves 10 to 31 per cent.

Allentown Race Meet July 31

ALLENTOWN, PA., July 24—A race meet is scheduled for the Allentown Fair race track July 31, when seven events will be run off under the management of the Matty Matthews Racing Association of New York under the sanction of the American Automobile Association.

Packard Tests at Indianapolis

INDIANAPOLIS, IND., July 24—J. G. Vincent, vice-president of the Packard Motor Car Co., accompanied by a corps of assistants has been here for the past week experimenting with twin-six models. It is understood that hereafter all Packard experimental work of consequence will be completed on the local speedway.

Show at Michigan State Fair

DETROIT, MICH., July 26—At the annual Michigan State Fair which will be held here Sept. 6 to 15, the automobile show will again be a feature. Most of the local automobile dealers have already taken space, it is said, by the fair officials, and like last year the Ford Motor Co. will have a miniature Ford assembling plant in operation.

Among the passenger cars thus far on the list to be shown are: Ford, Dodge

King, Haynes, Grant, Reo, Mitchell, Cadillac, Hudson, Studebaker, Buick, Ross, Overland, Oakland, Chandler, Hupmobile, Chalmers, Chevrolet, Willys-Knight, Ohio electric and Maxwell. There are the following makes of trucks: Standard, Kalamazoo, Kosmath, Signal, Federal. Accessory dealers are applying for space.

Apperson Adds Four-Passenger Roadster

KOKOMO, IND., July 25—The Apperson Bros. Automobile Co. is placing on the market what it styles a four-passenger roadster. The driver's seat is divided from that of his companion by an aisle and directly behind there are two cornering seats with ample leg room in the aisle. The top covers all four seats but when two are not in use they are covered by the dust hood.

Fall Show for Denver

DENVER, COL., July 21—A two weeks' motor car and accessory show is being planned for Denver by the Automobile Trades Association of Colorado, to be held in connection with the International Soil Products Exposition Sept. 27 to Oct. 10. The exposition is expected to draw a large attendance from a wide territory, and consequently is counted upon as a substantial aid to the motor show.

The Denver dealers held a fall show last September in connection with the Denver Motor Club's two-day race meet.

Dallas to Have Fall Show

DALLAS, TEX., July 24—Plans are being made by Dallas Automobile Dealers' Association to have the greatest automobile exhibit at this year's Texas State Fair in October that has ever been seen in the South.

Hostetter Leaves Prest-O-Lite

INDIANAPOLIS, IND., July 24—Stuart S. Hostetter has resigned as head sales correspondent of the Prest-O-Lite Co. to become a member of the Hurst & Company's wholesale purchasing department. He will serve as manager of the sales and advertising department.

Pathfinder Prepares to Expand

INDIANAPOLIS, IND., July 27—The Pathfinder Co. has plans drawn for an addition 60 by 400 ft. to its plant to take care of the 3500 cars production for 1916.

New Trailer on Market

COLDWATER, MICH., July 20—A new trailer for automobiles is being manufactured by J. F. Laura, who has secured a patent for a connector used to join the trailer to the automobile. The trailer is made to carry a load of 1000 lb.

Lincoln Highway Route Changed

Washington and Baltimore To Be Included—Hercules Plant Auction Aug. 14

WASHINGTON, D. C., July 27—*Special Telegram*—Washington and Baltimore are to be on the Lincoln National highway. President Joy of the Lincoln Highway Assn., after having turned a deaf ear to appeals made more than a year ago by citizens of Washington and Baltimore, by a congressional delegation, and lastly by President Wilson to vary the course of the highway so that it might touch the national capital has notified Robert N. Harper, chairman of the committee selected last year by the District commissioners that he has found it possible to change the original plans and place both cities on the route.

Route Through Washington

Colonel Harper already has advised the commissioners of Joy's decision and the work of marking the city streets which will constitute the portion of the highway running through the district and obtaining the improvements necessary in Maryland will be taken up immediately. The highway will enter the district by way of Maryland Avenue, northeast, swing through Potomac Park past the Lincoln memorial, and then proceed westward by way of the Rockville Pike to Gettysburg.

Prest-O-Lite Increases Facilities for Drawn Steel Demand

INDIANAPOLIS, IND., July 21—As announced in THE AUTOMOBILE for July 22, the Prest-O-Lite Co., Inc., this city, has turned its attention to the manufacture of cold drawn steel parts and has now outfitted one of the largest plants in the country to take care of this work. At the present time the Prest-O-Lite concern has in service three 400-ton hydraulic presses, one 300-ton hydraulic press, and is at present engaged in installing what is probably the largest hydraulic press in the country, having a capacity of 800 tons. This new press is large enough to break down 60 in. in diameter steel circles $\frac{3}{8}$ in. thick, according to officers of the Indianapolis concern. In fact, it is claimed that with this press it will be possible to draw by the cold drawing process cylinders of approximately 20 to 22 in. in diameter, 48 in. in length from $\frac{3}{8}$ in. stock. With the present equipment cylinders 12 in. in diameter and 44 in. long from stock 0.260 in. thick are being drawn by 400-ton pressure. With the 800-ton press cylinder ends, etc., of larger diameter

than 20 in. on thinner than $\frac{3}{8}$ -in. stock will be handled.

With this large capacity the ability to meet large orders on such parts as brake drums and axle housings will be readily handled on the smaller-sized hydraulic presses. On small pressed or drawn steel parts of the shallow types the Prest-O-Lite equipment includes a large series of geared presses ranging from 100 tons down to 10 tons. The equipment is such that small work can be handled practically as readily as the larger work. In fact, an order has just gone through the factory for 25,000 stampings so small that twenty-five separate pieces were required to make an ounce.

New Battery Plant

In addition to this line of work the Prest-O-Lite concern has under construction a new building 100 by 400 ft. for use as a battery factory. It is also stated by the engineers of the company that another building of this same size will probably prove necessary. The company feels that the field for drawn steel cylinders is a large one and that with the equipment and present capacity of the plant, orders of any nature may be dealt with.

Hercules Plant to Be Sold Aug. 14

LOUISVILLE, KY., July 23—In accordance with a judgment granted against the company at the last court term, the real estate, buildings and equipment of the defunct Hercules Motor Car Co. will be sold at auction on Aug. 14. The total amount of judgments against the company is \$110,325. It is rumored that an effort is being made to interest capitalists for the purchase of the plant and continue its operation on an entirely new basis.

Lucas Moves to Lagrange

SOUTH BEND, IND., July 24—The Lucas Mfg. Co., manufacturer of electrical supplies and automobile accessories, which has been located in Chicago, for the last year, has decided to move the factory to Lagrange, Ind., where stock has been acquired by a number of Lagrange residents.

Elston Westcott Service Manager

RICHMOND, IND., July 22—C. J. Elston of Flint, Mich., has been appointed service manager of the Westcott Motor Car Co., this city. It is intended by the Westcott company to reorganize the service department completely and to thoroughly establish a policy which will follow the cars after they have left the factory. Mr. Elston was connected with the service department of the Buick Motor Co. for four years and later with the service department of the Hudson Motor Car Co.

Blue Book to Add a Volume

Will Cover Territory Below Potomac and Ohio Rivers—New Index Maps

NEW YORK CITY, July 26—The Automobile Blue Book Publishing Co., 239 West Thirty-ninth Street, this city, is going to add a new volume to its present series of Blue Books on road directions covering the territory in the Southeast below the Potomac and Ohio Rivers. Up to the present this territory has been covered partially by Vol. 3, covering New Jersey and Pennsylvania, Delaware and Maryland, and Vol. 4 covering the Middle West, but the increase in touring in the Southeast and because of greater road activity, the Dixie Highway being a typical example, a separate Blue Book will cover this territory in 1916. The Blue Book cars have already started out over the roads in this territory to get the exact road conditions and to write road guide information and will continue this work until late in the fall, thus adding route information on thousands of miles of highway in this section that have heretofore not been routed.

In this route work, the leading thoroughfares between large centers will be covered with odometer mileages, some of these being Washington to Atlanta, Jacksonville, New Orleans; Louisville and Nashville to Chattanooga, Atlanta, Florida and Gulf of Mexico; Richmond to Asheville, Chattanooga, Knoxville, Nashville, and Memphis; and New Orleans to Mobile and Jacksonville. After this secondary connecting routes will be gone over and odometer mileages written so that the tourist will be able to reach the majority of places without having to make any local inquiries. The Blue Book company is also preparing a series of general index maps, by reference to which the smallest villages in this territory can be located.

New Case Farm Tractors

RACINE, WIS., July 24—Several new types of gas power farm machinery were introduced to the public at the annual convention of branch managers and salesmen of the J. I. Case Plow Co., Racine, Wis., last week. Field demonstrations of the new Wallis Fuel Saver Tractor Cub and the J. I. Case power life engine gang plow were given on the big Case farm just outside of Racine.

To Build \$500,000 Ford Assembling Plant in Omaha

OMAHA, NEB., July 22—A site, a block long, between Cuming and Izard and Fifteenth and Sixteenth Streets, has

been purchased in this city by the Ford Motor Co., on which will be erected a building a block long and six stories high for use as an assembling plant, general service quarters and offices.

The building will have more than 200,000 sq. ft. of floor space and will cost \$250,000, and with machinery installed will represent an investment of \$500,000. The ground, on which the building will be erected, was bought last Saturday, the price, about \$105,000, being paid by Manager Charles Gould of the Ford company, Fred C. Shields, realty broker, and ex-Lieutenant Governor McGilton, attorney for the Ford company, to the various owners.

Three hundred men will be employed in the salesrooms, service station and assembling plant at the outset, after next April, when the building is expected to be finished. The Ford Motor Co. minimum wage of \$5 per day will be applicable to all.

Continental Adds to Muskegon Plant

DETROIT, MICH., July 24—The Continental Motor Mfg. Co., this city, is making extensive additions to its Muskegon, Mich., plant, which is devoted almost exclusively to the production of four-cylinder motors. Two reinforced concrete buildings, four stories in height will be constructed, one being 54 by 150 ft. and the other 70 by 330. Production of four-cylinder motors will be increased from 4000 to 6000 per month.

Studebaker Not to Move Plant

SOUTH BEND, IND., July 24—President Erskine of the Studebaker Corp. denied the report from New York concerning the probable extension of the home plant in South Bend by the purchase of \$800,000 worth of property here. "We have more room than we need here. We will positively not move the Detroit force here, and I cannot account for a rumor concerning the purchase of land," said Mr. Erskine.

Miller Rubber to Build \$50,000 Addition

AKRON, O., July 23—The Miller Tire & Rubber Co. will build a \$50,000 addition. It will be six stories and 109 by 154. Another smaller building, one story and basement, 57 by 40, is also to be a part of the extension. The company has made extensions during the year which, with the proposed building, will bring its building expenditures close to \$200,000.

Haynes Not to Move

KOKOMO, IND., July 27—General Manager Sieberling of the Haynes Automobile Co. emphatically denies the rumor that his company will move to Lackawanna, N. Y. Rumors to this effect were circulated around Buffalo some weeks ago but are entirely false.

32,000 Cars in Oklahoma

New Law Works Out Well— \$40,000 Fees Collected— Oklahoma City Statistics

OKLAHOMA CITY, OKLA., July 23—Oklahoma's new law has been in effect since July 1, and during the first three weeks of the month, the State highway department has collected nearly \$40,000 from automobile owners for licenses for their cars.

State Highway Commissioner A. N. Leecraft estimates there are 32,000 automobiles in the State.

Under the new law car owners must pay the State a license tax for their car, based upon the horsepower. For every horsepower the owner must pay 50 cents. This tax is in lieu of all other taxes, and is in great favor with automobile owners who compare the new tax with the tax under the old law. Ninety per cent of the money collected goes to the county from which it was originally collected and 25 per cent of the 90 per cent goes to the city where the car owner resides.

There are now 1900 automobiles in Oklahoma City worth approximately \$700,000. The horses number 1343 and are valued at \$66,350. The mules number seventy-five with a value of \$4,435. The total number of horses and mules is 1418 and the value of both but \$70,785. These figures were obtained from County Assessor J. S. Morrow.

The motor car has not made rapid gain in the county outside the city. The automobiles in the county, exclusive of Oklahoma City, number less than 100. The bad roads are largely responsible for this condition. Yet the total value of horses in the county, including Oklahoma City, is less than the value of the motors.

There are 9600 horses in the entire county worth \$553,092 as compared to \$717,915, the value of all the automobiles in the county.

On the basis of 75,000 population an average of one person in 39 owns an automobile in Oklahoma City.

To Build Hearses and Ambulances

GRAND RAPIDS, MICH., July 24—The Michigan Hearse & Motor Co. has been organized to succeed the Michigan Hearse & Carriage Co., which has been in business during the last twelve years. As the name indicates the new concern has done away with carriages and horses and will now build motor-driven hearses. These will be made at its own plant, as well as ambulances. The old plant of Walter Poor and Harry Yeider, on Wealthy Street, has been secured, and there, temporarily, the chassis will be

built. They will have a wheelbase of 148 in. and carry a six-cylinder motor. The capital stock of the company is \$150,000 of which \$25,000 is preferred. A two-story plant, 45 by 125 ft. is to be erected at Cottage and Grove Streets and Union Avenue.

Republic Truck to Add Again

ALMA, MICH., July 24—Although the Republic Motor Truck Co. made additions to its plant several months ago, the growing business has again made it necessary to further increase its size. At the present time two one-story buildings are being constructed. One is to be 30 by 450 ft. and will be used as a storeroom. The other, 50 by 100 ft., is to be the body shop. The total floor capacity of these buildings will be 18,500 sq. ft. Further extensions are contemplated which will add 20,000 more sq. ft.

Select Ford Nashville Site

NASHVILLE, TENN., July 24—For the purpose of selecting a site for the new assembling plant of the Ford Motor Car Works of Detroit, to be established in Nashville, M. N. A. Hawkins, an official of the company, was in Nashville Monday. Mr. Hawkins inspected some half dozen prospective sites for the new plant, which is to have a capacity for 15,000 cars annually, and which will give employment to about 700 men.

Lawrence Wants Austin Plant

LAWRENCE, MASS., July 24—The Industrial Committee of the Lawrence, Mass., Chamber of Commerce, having succeeded in getting the Lenox Motor Car Company to move to that city is now after other motor concerns, and an offer has been made to the Austin Automobile Co., Grand Rapids, Mich., to move East.

Nicholson Regal Asst. Sales Manager

DETROIT, MICH., July 26—E. W. Nicholson has been appointed assistant sales manager of the Regal Motor Car Co. During the last two years Mr. Nicholson had charge of Chalmers district sales work.

Buller Joins Apperson

KOKOMO, IND., July 22—H. L. Buller is now connected with Apperson Bros. Automobile Co. in charge of advertising.

\$15,000 Fire in Fisk Plant

SPRINGFIELD, MASS., July 23—Fifteen thousand dollars worth of building materials and four freight cars were destroyed by fire and a gasoline explosion in the yard of the Fisk Rubber Co., Chicopee Falls, late last week.

Jitneys Win in Indiana

P. S. C. Refuses Trolley Co. Petition That Commission Take Control and Regulate

INDIANAPOLIS, IND., July 24—The public service commission to-day entered an order dismissing the petition of the Terre Haute, Indianapolis and Eastern Traction Co., which sought to bring all jitney buses in the State under the control of the commission and subject to regulation by the commission.

At the hearing attorneys for the traction companies argued that the jitneys were common carriers and public utilities within the meaning of the utility law, and ought, therefore, to be regulated.

The commission's order was brief. It simply set out that the body had no jurisdiction and therefore dismissed the case. While the original petition related only to Terre Haute, the hearing on the proposal to place all jitneys under the regulation of the commission brought in the entire question of jitney competition with electric roads throughout Indiana. The commission was in session practically all day and prominent public utility magnates from all over the State attended the hearing.

Kansas City Jitneys Raise and Lower Fares

KANSAS CITY, MO., July 24—The jitney bus died, was born again, died again and was born once more all in the course of two days here last week. The Green Bus Line, outfitted with fifteen of the Studebaker medium-priced buses, went out of the hands of the company that has been operating them, through foreclosure. The Studebaker Corp. sold the buses on what its manager here described as a "shoe-string capitalization." The promoter of the company had no money to begin with and the Studebaker company sold the buses largely with a view to encouraging the industry. But the officials of the company lacked the business instinct and the payments fell behind. When the fifteen green buses went out of business, the White Star Line, a co-operative company, immediately announced that it would charge 10 cents and that action was followed by the other buses and dozens of the smaller touring cars. They were stampeded by the fate that had overtaken the green bus line. However, the competition of the small jitneys that had not changed from 5 cents and the fact that the women preferred the street cars at 5 cents, brought a change the day following and the buses and the smaller jitneys that had changed their price all

went back to 5-cent fares. The days the buses were charging 10 cents found them filled only in the rush hours, when the men were going to and from work.

There are practically as many buses and small jitney cars on the streets as there were earlier in the season. The Studebaker company is reselling its cars that were taken out of service as rapidly as possible.

Erdman-Guider Co. to Make Bodies

DETROIT, MICH., July 26—The Erdman-Guider Co. has been organized to make special automobile bodies and do a general automobile trimming, repairing and painting business. The concern has leased the old Herreshoff Motor Car Co. plant 2290 Woodward Avenue. Those interested in the new concern are A. R. Guider, president and business manager, who during the past 10 years was manager of the R. Herschel Mfg. Co., Saginaw, Mich.; Charles Erdman, vice-president who was vice-president and assistant general manager of Seivers & Erdman; H. L. Morrison, secretary-treasurer, who was connected with the accounting department of the Riverside Storage Co.

Weatherproof Body Co. Organized

DETROIT, MICH., July 26—The Detroit Weatherproof Body Co. has been organized and incorporated, its capital stock being \$10,000. The officers of the new concern are C. Haines Wilson, president and treasurer; Lawrence Moore, vice-president and general manager; George D. Wilson, secretary. Temporarily the headquarters of the company will be at 500 Clay Avenue. The new concern will make limousine tops, commercial car bodies and will also market a special Ford body.

Smith a Regal Sales Manager

DETROIT, MICH., July 27—H. H. Smith, formerly sales manager of the Diehl Mfg. Co., Elizabeth, N. J., and recently with the Triumph Electric Co., Cincinnati, O., has become district sales manager for the Regal Motor Car Co. with headquarters in San Francisco, Cal.

Denby Truck Reduces Prices

DETROIT, MICH., July 23—The Denby Motor Truck Co. has reduced prices from \$115 to \$215 on its three models of trucks. The trucks themselves have not been altered.

The 1-ton or model B is now listed at \$1,475, \$125 less than formerly; model D, 1½-ton, lists at \$1,685 or \$215 less than heretofore, and the 2-ton model E at \$1,985, which is a cut of \$115 from the former price.

These lower-price Denby trucks have

the same constructional features and equipment as before the new prices went into effect; in fact, there are no changes of any kind excepting the price.

A. S. Bowser Goes to Albany

SOUTH BEND, IND., July 24—A. S. Bowser, formerly secretary of the S. F. Bowser Co., Fort Wayne, Ind., has been transferred to the position of assistant general manager of the Albany, N. Y., office. President Bowser said no permanent secretary will be appointed at the home office for the present and the transfer of the president's son to the Eastern office is not the first of a big change in Bowser officialdom.

Bourquin Leaves Paige-Detroit

DETROIT, MICH., July 27—Jas. F. Bourquin, general manager of the Paige-Detroit Motor Car Co., has resigned. He was formerly with the production department of the Chalmers Motor Co.

Hood Detroit Sales Manager

DETROIT, MICH., July 26—Wallace C. Hood, who was sales manager of the former Briggs-Detroit Co. has been appointed to a similar position in the new Detroit Motor Car Co. Mr. Hood, previous to his connection with the Briggs-Detroit Co. was sales manager of the Standard Motor Truck Co., the Everitt Motor Car Co. and also the Chalmers Motor Co.

Pierce-Arrow Agency Officials Meet

BOSTON, MASS., July 24—The officials of the leading Pierce-Arrow agencies east of the Mississippi held a two days' meeting at Boston, Mass., this week, J. W. Maguire, the Boston agent, playing the part of host. They discussed many matters of interest to the business, and between times played golf and dined. There were present Col. Charles Clifton of Buffalo; R. D. Gerton and C. W. Cady of New York; Charles Hanhuer of Cincinnati; D. E. Odell of Minneapolis; Grant Waldraf, St. Paul; C. R. Clifford and E. H. Stoddard of Springfield, Mass.; H. Paulman of Chicago; W. H. Ellis of Newark, N. J.; Herman May of Pittsburgh; Samuel Berdean of St. Louis; J. B. Westefeld, New Haven, Conn.; W. J. Foss and W. R. Fassett of Philadelphia; E. C. Bull, W. Newman and R. Patten of Buffalo.

Post Stearns New York Sales Manager

NEW YORK CITY, July 25—The F. B. Stearns Co. of New York has appointed F. W. Post, Jr., sales manager. With secretary Thomas R. Jacobs, he will carry out the duties previously performed by William Arthur Lesser, who was killed in an automobile accident last month.

Factory Miscellany

Orr Plant at Yazoo City—The Orr Modern Motor Co., recently organized, will construct a plant at Yazoo City, Miss., for the manufacture of automobiles.

Auto Crank Shaft to Add—The Auto Crank Shaft Co., Piquette Avenue, Detroit, Mich., has awarded the contract for the construction of a one-story brick addition to its factory.

Toledo-Ford Tire Addition—Plans are being made for the construction of a new addition to the Toledo-Ford Tire Co.'s factory on Western Avenue, Findlay, Ohio. It will be 50 by 130 ft. and four or more stories high.

Wilson Foundry to Double Plant—The Wilson Foundry & Machine Co., Pontiac, Mich., expects to double its plant within the next few months. For this purpose about 10 acres of land have been purchased recently. The present force of 600 will be doubled, it is said.

Saxon Ships 11,000 Cars—During the first six months of 1915 the Saxon Motor Co., Detroit, Mich., has shipped about 11,000 Saxon fours and sixes. Production is being increased gradually and it is expected by officials of the company that the output for the remainder of this year will be at least equal to that of the first half.

To Enlarge Building—The Gas Power Engineering Co., operating a large garage and machine shop at North Avenue and Second Street, Milwaukee, is about to increase its capacity by the construction of a complete third story. The original building consisted of one story, and a year and a half ago a second story

was added. The building is 60 by 150 ft.

Des Moines Co. to Build—The Clemens Auto Co., Des Moines, Iowa, has bought an eighth of a block on Eleventh and Mulberry Streets at a cost of \$40,000 and will build a four-story, fireproof brick building thereon to cost \$40,000. It will house the business of the company after Jan. 1, 1916. The company handles the Overland car for the Des Moines territory.

To Make Piston Rings—The Continental Piston Ring Co., Memphis, Tenn., has been incorporated with a paid in capital of \$100,000. It will manufacture piston rings for locomotives, engines, automobiles and pumps of various kinds. The officers are B. H. Mason, president; W. P. McCadden, vice-president; R. E. Brown, secretary and treasurer, and C. R. Bryant, chief engineer.

Bulford to Enlarge Plant—The Bulford Truck Co. has decided to erect a large addition to its factory in Fremont. H. G. Bulford, the president, who leaves this week for England, announces that the company will turn out a large number of motor ambulances for Red Cross service in Belgium and France. As soon as the addition is completed, a large increase in the working force will be made.

Victor Tire to Build Again—The Victor Rubber Co., Springfield, Ohio, will erect another building, to be two stories, 30 by 108 ft. It will be erected on the ground between the two wings of the main factory building. The addition will be much like the one which was completed a few weeks ago. A mileage capacity test is now being made of the new

pneumatic tire made by this concern. An automobile has been equipped with a set of these tires and will be run 300 miles a day while they last.

American Brass Adds—The American Brass Co., Kenosha, Wis., has just completed a large brass foundry addition in record time. Just thirty days after the contract for the erection of the shop was signed by the American Bridge Co. the building was turned over to the owners for installation of equipment. The shop is of steel and sheet iron, 330 ft. long, 60 ft. wide and 27 ft. high. The extraordinary demand for brass goods, particularly from the automobile trade, made the erection of the addition imperative.

Wisconsin Breaking Records—The Wisconsin Motor Mfg. Co., Milwaukee, is working the longest hours and the largest force of workmen in its history, due to the extraordinary demand for motors from car and truck manufacturers. The company some time ago reached the highest production it has ever known, but this was insufficient to meet specifications and schedules have been extended to the full limit of the plant's capacity. It is likely that additions will be made during the winter months in anticipation of a continuance of the demand for 1916.

Kansas City Ford Expands—The Ford Motor Co. is preparing to make an addition to its plant in Kansas City, Mo., to cost about \$175,000. The addition will be two buildings, one 54 by 75 ft., the other 120 by 400 ft., both three stories, of reinforced concrete and tile roof. The work will be completed by Dec. 31.

The Automobile Calendar

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| July 31.....Des Moines, Ia., Speedway 300-Mile Race. | Sept. 8-11.....Hamline, Minn., 2-Day Meet at State Fair Grounds between Minneapolis and St. Paul, State Fair. | Oct. 2.....New York City, Sheepshead Bay Motor Speedway Track Meet. |
| Aug.....Milwaukee, Wis., Independent Petroleum Marketers' Assn. of the U. S.; 1915 Convention in Milwaukee. | Sept. 13.....Oakland, Cal., Pan-American Road Congress. | Oct. 2-9.....Cincinnati, Ohio, Show, Music Hall, Cincinnati Automobile Dealers' Assn. |
| Aug. 2-3.....San Francisco, Cal., Tri-State Good Roads Assn., Third Annual Convention. | Sept. 17-18.....Peoria, Ill., Illinois Garage Owners' Assn. Convention. | Oct. 3-10.....St. Louis, Mo., Show, Forest Park Highlands, St. Louis Automobile Manufacturers and Dealers' Assn. |
| Aug. 7.....Chicago, Ill., 100-Mile Match Race, Chicago Speedway. | Sept. 18.....Providence, R. I., 100-Mile Race, Narragansett Park Speedway, Inc. | Oct. 6-16.....New York City, Ninth Electrical Exposition and Motor Show at Grand Central Palace. |
| Aug. 7.....Rockford, Ill., Hillclimb, Rockford Motor Club. | Sept. 18-25.....Los Angeles, Cal., Show, Shrine Auditorium. | Oct. 11-12.....Dayton, O., National Paving Brick Manufacturers' Assn., Annual Meeting. |
| Aug. 20-21.....Elgin, Ill., Road Races. | Sept. 20-25.....San Francisco, Cal., International Engineering Congress. | Oct. 16.....Chicago, Ill., 350-Mile Race, Chicago Speedway. |
| Aug. 30.....Columbus, O., Show, Ohio State Fair, Columbus Auto. Show Co. | Sept. 24.....Indianapolis, Ind., S. A. E. First Section Meeting. | Nov. 18.....Arizona 150-mile Grand Prix. |
| Sept.....Peoria, Ill., Second Northwestern Road Congress. | Sept. 27-Oct. 10.....Denver, Col., Show, International Soil Products Exposition, Automobile Trades Assn. of Colorado. | Nov. 29-Dec. 4.....Electric Prosperity Week. |
| Sept. 4.....Minneapolis, Minn., Track Race; Twin City Motor Speedway Co. | Oct.....Dallas, Tex., Show, Dallas Automobile Dealers' Assn. | Dec. 31.....New York City, Show; Grand Central Palace. |
| Sept. 6-10.....Indianapolis, Ind., Show, Indiana State Fair. | Oct. 1-2.....Trenton, N. J., Track Races; Inter-State Fair. | Jan. 22, 1916.....Chicago, Ill., Show; Coliseum. |
| Sept. 6-15.....Detroit, Mich., Show, Michigan State Fair. | | March 4-11.....Boston, Mass., Truck Show, Mechanics Bldg. |

The Week in the Industry



Rogers Forms New Co.—Mason T. Rogers, up to the present time manager of the Buffalo, N. Y., branch of the Packard Motor Car Co., has resigned to enter business for himself. He has formed a firm styled M. T. Rogers & Co. and has associated with him C. W. Burton, formerly of the Daniel Green Felt Shoe Co., L. E. Moore, formerly connected with the Packard Philadelphia branch, and E. C. Fish, recently connected with the Buffalo Hudson company. The new company will gradually absorb the business of the Universal Equipment Co., supply dealer.

Jones Represents Midgley—Temple Jones, who has been connected with the Tire Sales Company, 204 St. Paul Street, Baltimore, Md., representatives of the Midgley and Republic tires, has become the direct representative of the Midgley company.

Dealer

Opens New Salesrooms—The Collins-Clem Auto Co., agent for the Studebaker in San Antonio, has opened new salesrooms and service station at the corner of Navarro and Crockett Streets.

Fanning to Handle Apperson—Frank Fanning, local distributor of the Marmon in Philadelphia, Pa., and W. T. Taylor, wholesale representative of the Apperson, have entered into an agreement whereby the Philadelphia Apperson retail trade will be handled by the Fanning company.

Maxwell Dealers Gather—Ralph Coburn, Eastern district supervisor of the Maxwell Motor Car Company, had the New England dealers as his guests at a meeting in Boston last Wednesday and Thursday, when he showed them the new 1916 Maxwell car. There were more than fifty present.

Overland Dealers Meet—The seventy-five Overland dealers in Eastern New England met at the Hotel Lenox last Friday night at a dinner as guests of the Connell & McKone Co., Greater Boston distributors of the Overland products. Joseph McDuffie, assistant salesmanager of the Willys-Knight, was guest of honor.

Used Car Week—The Rooke-Osmond Motor Co., Milwaukee, Wis., State distributor of the Jeffery, repeated its Used Car Week selling campaign last week and disposed of practically its entire stock of used cars, many for jitney purposes.

Motor Men in New Roles

Talbot Pathfinder Mgr.—W. E. Talbot, 408 Sumpter Bldg., Dallas, Tex., has been appointed Southern district sales manager for the Pathfinder Motor Car Co. of Indianapolis.

Austin Metz Sales Mgr.—Harry D. Austin has been made sales manager for the Seattle Metz factory branch, after a year's absence with the Metz company in California.

Fick Monarch Purchasing Agent—F. B. Fick, formerly with the Abbott Motor Car Co., has been appointed purchasing agent of the Monarch Motor Car Co. Detroit, Mich.

Knaus Makes Change—A. H. Knaus, formerly district manager for the Chalmers in southern California, has been made sales manager of the Braley Auto Co., Franklin distributors in Portland, Ore.

Abel Houk Agent—George I. Abel, western agent for the Houk Mfg. Co., has opened a branch in San Francisco to handle the Houk wire wheel. Abel is the representative for seven western States.

Kidd Paige District Mgr.—S. W. Kidd has been appointed district sales manager by the Paige Motor Car Co. with headquarters in St. Louis. He was formerly connected with the Detroit Kan-sas City Co.

Chandler Noxall Distributor—W. R. Chandler, president of the Spar-East Co., eastern distributor of Sparton horns and other Sparton products, has become the eastern distributor for the Noxall Shock Absorber made by the Baker-Duffy Co., Chicago.

Donovan in Business—Frank B. Donovan, long associated with the Donovan Motor Car Co., Boston, has entered the trade in Baltimore, Md., as Studebaker distributor under the style Frank B. Donovan, Inc. Frank Carthew is president of the concern, and Donovan is treasurer and general manager. An office, salesroom and service station will be opened at 10-20 East North Avenue.

Ridenor with Madison—K. A. Ridenor, for several years in charge of the Louisville office of the Waverley Electric Co., has resigned to become assistant to Roy Potts, vice-president of the Madison Motor Co., Anderson, Ind. Mr. Potts formerly was sales manager of the Waverley Co. at Indianapolis. George Cheschire, southern representative of the

Waverley Co., is temporarily in charge of the Louisville office of the Indianapolis concern.

Balough's Headquarters in Springfield—Charles Balough, who has been identified for the last five years with The Kelly-Springfield Motor Truck Co., Springfield, Ohio, as chief engineer and works manager, resigned from that company last June to take up the development of a new proposition in the commercial car field. Mr. Balough announces his headquarters as Columbia Street and Dakota Avenue, Springfield, Ohio, where he is conducting the development work of his new connections.

Kenny Returns to St. Louis—F. C. Kenny, who for four months was manager of the Studebaker branch at Memphis, Tenn., has returned to St. Louis and resumed the duties of assistant manager of the St. Louis Studebaker branch, which position he held before going to Memphis.

Garage

Garage and Repair Shop—John Gumb is erecting a \$12,000 garage and repair shop building at Teutonia Avenue and Alten Street, Milwaukee, Wis. It will be 30 by 125 ft.

New Baltimore Garage—The Central Automobile Co. has opened a large garage in Baltimore, Md., in a place which was constructed by the city as a market house. The company can care for seventy-five cars. Twenty-four-hour service and accessory service is maintained.

Build New Garage—Dvorak & Gaynor, Kewaunee, Wis., have broken ground for a new garage 40 by 120 ft. The business was established by the late John Gaynor in the spring of 1912 and is being continued by his son and J. F. Dvorak. The concern represents the Chalmers and Dodge.

Recent Texas Garage Happenings—The Lone Star Motor Co., El Paso, Tex., has moved into its new building, at Chihuahua and Overland Streets. It now has 24,000 sq. ft. of floor space at its disposal. The company has secured the Southwestern distributing agency for the Chalmers and handles Dodge, Hupmobile and Chandler. The Federal Tire Co. has opened an agency at El Paso, in the Overland Building, with F. M. Bannell in charge. The Federal Motor Truck Co. has placed the distributing agency for its products in Houston with the Houston Motor Truck Co.